Commercial Fisheries Abstracts

a monthly summary of important developments for the fishery industries

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Vol. 7 No. 1 January 1954

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DOUGLAS McKAY, Secretary

FISH AND WILDLIFE SERVICE

JOHN L. FARLEY, Director

Commercial Fisheries Abstracts

Prepared in the Branch of Commercial Fisheries

EDITORS

A. W. ANDERSON, Chief, Branch of Commercial Fisheries

DONALD Y. ASKA, Chief, Educational and Market Development Section

ASSOCIATE EDITOR

MAURICE E. STANSBY, Chief, Pacific Coast and Alaska Technological Research

ASSISTANT EDITOR

ROY C. STEVENS, Fishery Products Technologist, Seattle

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Following is a brief outline of this filing system. The numbers apply to the first digit appearing on each card. For the meaning of subsequent digits, please see the above described leaflet.

0	General and theoretical	5	Vitamins
1	Fish by species	6	Fishery byproducts
2	Fresh fish	7	Analytical Methods
3	Preserved fish	8	Composition
4	Oils	9	Miscellaneous

Issued with the approval of the Bureau of the Budget, December 29, 1953

7.43 REPORT ON SOLIDS IN RAW OYSTERS

Price, Douglas C. and Traynor, John P. (Food and Drug Administration, Baltimore, Maryland)
Journal of the Association of Official Agricultural Chemists 36, No. 3, 608-617 (August, 1953)

Total solids content of oysters were compared when the oysters were prepared for analysis (1) in a Waring blendor and (2) by grinding in a food chopper. The following are typical of the results obtained:

Analyst	Sample	Drained liquid	Blendor Method: Av. Solids 4 hours drying	Blendor Method: Difference between duplicate determinations	Food Chopper Method: Av. Solids 4 hours drying	Food Chopper Method: Difference between duplicate determinations
		percent	percent	percent	percent	percent
1	1	24.0	11.88	0.08	11.82	0.24
3	1	31.0	11.63	0.03	12.07	0.10
4	1	32.9	12.02	0.02	12.38	0.08
5	1	31.0	11.61	0.06	12.28	0.23
6	1	33.7	12.03	0.04	11.88	0.11
7	1	24.0	12.15	0.01	12.03	0.28

Precision by the same analyst on duplicate samples was considerably better when the Waring blendor was used than when a food chopper was used.

(over)

 ABSTRACTER: M. E. Stansby

7.43 REPORT ON FISH AND FISH PRODUCTS

Voth, Menno D. (Food and Drug Administration, Seattle, Washington)
Journal of the Association of Official Agricultural Chemists 36, No. 3, 606 (August, 1953)

Work on fish and fish products in progress includes a collaborative study for the determination of total solids in fish and fish products; an investigation of the use of a forced-draft oven in determination of the total solids content of fish; an investigation of a rapid ether extraction of fish being conducted by collaborative study; determination of total solids in oysters being investigated by chemical and viscosimetric methods.

Certain changes have been recommended in official methods for oyster analyses. These include reduction of drying time for oysters to 3 hours at 98-100° C.; use of a Waring blendor for preparing oyster samples; and elimination of the requirement that oyster meats and liquid be analyzed separately.

 ABSTRACTER: M. E. Stansby

6.3 THROUGH-CIRCULATION DRYING OF SEAWEED. III. LAMINARIA DIGITATA FROND AND STIPE; LAMINARIA SACCHARINA FROND

Gardner, R. G. and Mitchell, T. J.
Journal of the Science of Food and Agriculture 4, No. 8, 364 (August, 1953)

The drying characteristics of Laminaria digitata frond and stipe have been studied and are compared with those of L. cloustoni frond and stipe.

A striking similarity was found in the shapes of the curves of time versus air velocity for the fronds and stipes respectively of the two species. The empirical equations for fronds were similar in type and those for the stipes were also similar. It was concluded that the physical differences between the two parts of the same plant had a greater influence on the drying time than the differences between the three common sublittoral species.

The close agreement between the species was most marked in the effect of bed depth on the drying time. This relationship was apparently independent of any particle-shape factor since fronds (either minced, shredded, pre-dried or wet) gave the same general type of curve, i. e. concave upwards. The bed-depth curves for minced or sliced stipe were in general agreement, but were in contrast with the frond curves.

These physical properties of stipes and fronds have been compared with those of other vegetable materials (hops, potatoes, carrots and brewer's spent grain) and it has been shown that the time versus bed-loading curves for all these materials can be classified into three groups, depending on whether the material is compressible or rigid.

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 Author's abstract

7.53 REPORT ON TOTAL SOLIDS AND ETHER EXTRACT IN FISH

Risley, H. M. (Food and Drug Administration, Seattle, Washington)
Journal of the Association of Official Agricultural Chemists 36, No. 3, 607-608 (August, 1953)

An oil determination method in canned salmon involving shaking of the ground fish flesh with ethyl and petroleum ethers in the presence of anhydrous sodium sulfate and sand is proposed. The procedure used is as follows:

A five-gram sample of ground fish is weighed into a 250-ml. centrifuge bottle. Next about 10 grams of 20-mesh Ottawa sand is added followed by the addition of about 10 grams of anhydrous sodium sulfate. Exactly 25 ml. of ethyl ether is then added and, finally, exactly 25 ml. of petroleum ether. The bottle is stoppered and the stopper is held in place by a wide rubber band. The tube is vigorously shaken by hand for a short time to break up and disperse the fish solids and then for a 30-minute period, followed by centrifuging for about 10 minutes, or until a solid cake forms leaving a clear ether solution. A 20-ml. aliquot is pipetted into a tared 50-ml. beaker and evaporated to dryness on a steam bath with a gentle stream of air directed into the beaker to eliminate bumping. The beaker is heated 15-20 minutes in an air oven at 100° C., cooled in air and weighed.

$$\% \text{ fat} = \frac{\text{weight of fat} \times 50 \times 100}{\left[20 - \left(\frac{\text{weight of fat}}{0.92}\right)\right] \text{weight of sample}}$$

 ABSTRACTER: M. E. Stansby

6.3

The output versus bed-loading curve for the first group (materials similar to fronds) reaches an optimum value, and mathematical considerations have demonstrated that the optimum drying time is about twice the minimum time. The minimum time for through-circulation drying is the period required to dry a single layer of the material, and is represented by the intercept of the smooth curve (of time versus bed-loading) on the time axis.

The effect of agitation on the reduction of drying time was investigated for two-inch beds of L. digitata frond. Agitation was carried out at equal time-intervals and has been expressed as effective stages. In the first half of the run (T = 7 to T = 3, where T = total water content, lb. of water/lb. of bone-dry solid) three effective stages reduced the time to only 95% of the corresponding static time, whereas a reduction to about 40% was obtained in the range 3 to 0.1.

Bed-depth experiments suggest that L. digitata plants dry faster than, and L. saccharina slower than, L. cloustoni. Internal temperatures of a 1/8-in. slice of L. cloustoni stipe during a drying run have been measured. The effect on drying time of storage between harvesting and drying has been found for L. digitata frond.

7.43 (Cross Reference: 1.81)

In another experiment, data are presented which show that reproducible results are obtained on total solids in oysters when the entire oyster sample (meats and liquid) is blendored together and analyzed as a composite sample. According to the official method, when employing a meat chopper, meats and liquid must be analyzed separately.

In another experiment oysters were dried for periods of 2, 3, and 4 hours at 98-100° C. in an air oven. The following are typical of the results obtained:

Analyst	Sample	Drained liquid	Percent Total Solids			Percent Difference Between Hours	
			Hours Dried				
			2	3	4	2 and 4	3 and 4
1	1	24.0	12.02	11.90	11.88	0.14	0.02
3	1	31.0	11.73	11.67	11.63	0.10	0.04
4	1	32.9	12.14	12.07	12.02	0.12	0.05
5	1	31.0	11.81	11.68	11.61	0.20	0.07
6	1	33.7	12.18	12.07	12.03	0.15	0.04
7	1	24.0	-----	12.19	12.15	----	0.04

On the basis of such data it is concluded that the determination of total solids in oysters requires a drying period of greater than 2 and less than 4 hours.

In the light of the foregoing results it is recommended that a Waring blendor be used in preparing samples of composited oyster meats and liquids and that the samples then be dried 3 hours at 98-100° C. in air before analysis for total solids.

7.43 (Cross Reference: 7.53)

2.02 DETERMINATION OF LACTIC ACID IN FISH MUSCLE

Locke, Richard M.
Thesis: Northeastern University, Boston, 1935

This thesis was based on work carried out at the former Bureau of Fisheries Technological Laboratory at Gloucester, Mass. Lactic acid was extracted from fish muscle by maceration of the flesh with cold ethanol. An aliquot of the resulting solution was used for the determination employing the method of Friedmann, Cotonio, and Shaffer. In this method lactic acid is oxidized by permanganate to acetaldehyde. The acetaldehyde is then distilled into a bisulfite solution and that bisulfite bound by the acetaldehyde is determined by titration with an iodine solution.

The development and disappearance of lactic acid in iced fish was measured. A maximum lactic acid concentration was reached after about 3 days' storage in ice. This concentration remained fairly constant for about 1 week of storage after which the lactic acid concentration decreased.

The maximum lactic acid content reached varied with the particular species of fish as follows:

Species	Average Maximum Content of Lactic Acid in Flesh %
haddock	0.34
pollock	0.33
cod	0.17
squirrel hake	0.13

This order was the same as the order of keeping quality of the fish, the haddock having the longest keeping time and squirrel hake the shortest. This correlation would be anticipated on the basis that

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 ABSTRACTER: M. E. Stansby

2.41 WATERTIGHT PLYWOOD BARREL PRODUCED IN NORWAY

Anonymous
U. S. Department of the Interior, Fish and Wildlife Service, Seattle, Washington, Fishery Products Report No. 213 (October 29, 1953)

A cylindrical lightweight and watertight plywood barrel has been put into production in a factory in Larvik, Norway, reports an October 15 release from the Norwegian Information Service. The barrel is the combination of four new patents: two Norwegian, one Finnish, and one Danish. As soon as possible other factories will be established in a number of towns on the west coast of Norway and in north Norway.

Weighing one-third less than stave barrels, the new type will effect substantial freight savings. At the same time, being absolutely watertight, it is suitable for salted herring, fish oil and whale oil, and berries.

Initially, the barrel will be made with an inside diameter of 460 millimeters (18 inches). The height, however, can be adjusted according to the volume content desired--from 35 to 120 liters (9 to 32 gallons). Later on, as the demand expands, the barrel will be made with different diameters to hold anywhere from 20 to 200 liters (5 to 50 gallons).

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1.2 THE FISHERY FOR SARDINES IN JAPANESE WATERS

Fujinaga, Motosaku (Chief, Research Division, Fisheries Agency, Japan)
Pan American Fisherman 8, No. 2, 10-11, 23 (September, 1953)

The term "Iwashi" is used in Japan to include, collectively, sardines, anchovies, and round herring. Statistics of the catch by individual species have been recorded only since 1951. Figure 1, below, represents, in thousands of metric tons, the annual production of "Iwashi" from 1894 to 1951.

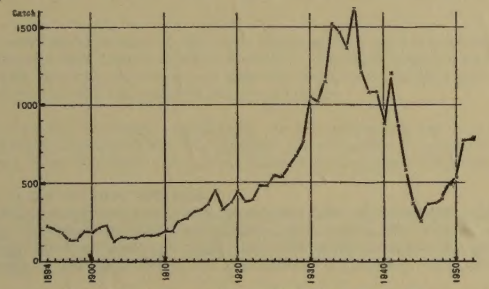

Figure 1—Showing the ups and downs of "Iwashi" catches, 1894 to 1950.

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 ABSTRACTER: Roy C. Stevens

2.12 GULF OF MAINE BLUEFIN TUNA EXPLORATION--1952

Murray, J. J.
Commercial Fisheries Review 15, No. 7, 1-17 (July, 1953)

The second phase of a bluefin tuna exploration in the Gulf of Maine was carried out in the summer and early fall of 1952 by the Exploratory Fishing Section, Branch of Commercial Fisheries, of the U. S. Fish and Wildlife Service. A 78-foot New England fishing schooner, the Marjorie Parker, was chartered for the study. This was a continuation of the work started in 1951 to determine the possibility of establishing a bluefin tuna fishery in the Gulf of Maine. In 1951, 19,000 pounds of tuna were caught by purse seining. In 1952, other types of gear were used including Japanese-type floating longlines, gill nets, trammel nets, surface trolling lines, and hand lines.

The unit of longline gear is a "basket". This consists of a main line of 900 feet in length that is set in a horizontal position between floats, seven branch lines of 25 and 50 feet in length that hang vertically from the main lines and terminate with bait hooks, float lines that attach the main line to the floats, and glass ball floats of approximately 1 foot in diameter that are attached at each end of the basket of gear.

The longline gear was set as the vessel moved slowly ahead, the main line being tied to a flagpole buoy and successive baskets of gear being attached in a string as the line paid out. The line was taken in over a deck-rail roller into a line hauler which coiled it automatically into a basket. The branch lines were coiled by hand.

The most successful bait used was squid (Loligo pealei). Other types of bait used were menhaden (Brevoortia tyrannus) and mackerel (Scomber scombrus). Sea herring (Clupea harengus) and alewives

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 ABSTRACTER: Keith A. Smith

1.2 (Cross Reference: 1.015)

The increase in catches in the decade starting in 1914 or so was largely due to the powering of coastal vessels and to the introduction of purse seines and encircling nets. The rapid decline in the fishery after its peak in 1936 is attributed to a diminishing of the stocks of fish. Whether this was due to overfishing or to natural causes is not known.

It has been estimated that the 1936 catch was composed as follows: sardines, 90%; anchovies, 7%; and round herring, 3%. In contrast, the 1952 records show sardines as composing only 47.5% of the catch, anchovies 45.2% and round herring 7.3%. The recent increases in the catches of "Iwashi" have been largely contributed by anchovies rather than by sardines. There are no indications at present of a recovery of the sardine population.

2.12 (Cross Reference: 1.1)

(Pomolobus pseudoharengus) were found to be unsuitable.

One-hundred-eighteen longline sets were made and 311 fish were caught having a total estimated round weight of 12,000 pounds. The fish ranged in size from 9 to 200 pounds with an average of about 38 pounds. Most of these were caught near the surface.

Seventeen gill nets were used, eleven of linen and six of nylon. These had meshes of 12, 13, 14 and 15 inches stretched mesh measure. Five trammel nets were used, two having outer walling of 24-inch mesh (stretched measure) and inner netting of 10-inch mesh, and three having outer walling of 15-inch mesh and inner netting of 5-inch mesh. Sixteen sets were made with the gill and trammel nets without catching any tuna.

Seven trolling lines were towed while under way. Several types of trolling jigs were used including white, yellow, and red double-hooked "bone" jigs; green and red plastic squids; and lead jigs with red and white feathers. A total of 6 bluefin and 3 little tuna (Euthynnus alletteratus) were caught trolling.

Surface schools of bluefin tuna sighted during the exploration were estimated at 200 tons as compared to 500 tons during the 1951 exploration. Two especially productive areas were found within the Gulf of Maine. During July and August 103 tuna averaging 40 pounds each were caught east of Cape Cod on grounds 11 to 26 miles east by north of Chatham Light near the south tip of Cape Cod. Early in August 96 tuna were caught on Wild Cat Ridge, 28 to 40 miles east southeast of Eastern Point Light.

The average catch of longlining operations was 3.7 tuna per 100 hooks, which is probably too low a return for profit based on American fishing standards. However, catches made at the peak of the season (July and August) averaged 7.2 tuna per 100 hooks on sets of approximately 4 hours' duration, and individual sets ranged as high as 46 tuna per 100 hooks.

2.02 (Cross Reference: 3.239)

high lactic acid contents produce low pH values which are unfavorable to bacterial growth.

Development of lactic acid in mackerel flesh frozen with dry ice immediately after catching and then thawed was measured. The results were as follows:

Time stored in ice after thawing	Lactic Acid Content of flesh	Time stored in ice after thawing	Lactic Acid Content of flesh
hours	%	hours	%
0	0.114	5	0.235
1	0.137	8 1/2	0.177
2 1/2	0.263	12	0.157

This shows that the mechanism for production of lactic acid from glycogen in fish flesh is not destroyed by freezing.

In another experiment mackerel were frozen both before rigor developed (freezing started while fish were alive), and after rigor development was complete. The fish were then thawed, stored in ice, and their lactic acid content was measured at intervals. The following results were obtained:

	Fish Frozen Alive		Fish Frozen in Rigor	
Storage period in ice after thawing	Lactic acid content of flesh	Condition of flesh	Lactic acid content of flesh	Condition of flesh
days	%		%	
0	0.29	fresh	0.51	fresh
3	0.30	fresh	0.32	sl. stale
7	0.51	stale	0.49	putrid
0	0.13	fresh	0.26	fresh
4	0.48	fresh	0.38	fresh
9	0.50	stale	0.33	putrid

These results indicate that fish frozen before rigor develops, upon thawing have a longer keeping time than fish similarly treated but frozen after development of rigor.

0.33 CHEMISTRY OF BROWNING REACTIONS IN MODEL SYSTEMS

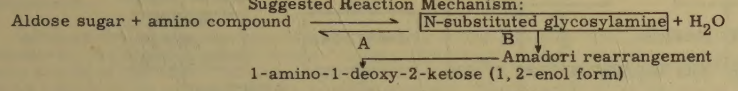
Hodge, John E. (Northern Regional Research Laboratory, Peoria, Illinois)
Journal of Agricultural and Food Chemistry 1, No. 15, 928-943 (October 14, 1953)

Three types of browning reactions are important in food technology. Oxidative reactions, often enzyme catalyzed, include such changes as browning of surfaces of freshly cut fruit. Joslyn and Ponting have reviewed enzymatic oxidative changes in Volume 3 of "Advances in Food Research", pp. 1-44. Little is known about a second type involving heating of such compounds as sugars to high temperatures to produce caramelization. The present review is concerned largely with the reaction mechanism of a third type, carbonyl-amino reactions which are most commonly encountered in food technology and which have been the basis of intensive research since 1940. The browning reaction of the amino-carbonyl type occurs in three stages as follows:

I. Initial Stage (Colorless)
   A. Augar-amine condensation
   B. Amadori rearrangement
II. Intermediate Stage (Colorless or yellow)
   C. Sugar dehydration
   D. Sugar fragmentation
II. Intermediate Stage (Continued)
   E. Amino acid degradation
III. Final Stage (Highly colored)
   F. Aldol condensation
   G. Aldehyde-amine polymerization

A bibliography with 201 references is included.

Suggested Reaction Mechanism:



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 ABSTRACTER: M. E. Stansby

0.35 BIOCHEMISTRY OF FISH MUSCLE POST-MORTEM CHANGES AND EXTRACTIVES

Anonymous
Report of the Food Investigation Board (Great Britain) For The Year 1952, 39-40 (1953)

An accurate spectroscopic method has been worked out for determining carbohydrates in fish muscle immediately post-mortem. Distilled water containing silver sulfate is used to extract the finely-divided muscle for the removal of carbohydrates. The extract is treated with sulfuric acid under standard conditions and the carbohydrates are determined by measuring the absorption at 320 mμ. The band that develops in the carbohydrate solution as a result of treatment with sulfuric acid is characteristic of furfural and its derivatives. A study has been made of the furfural derivatives that form when various other sugars are dehydrated with sulfuric acid.

A technique for injecting solutions directly into the veinous system has been used in connection with a short study of the anatomy of the cod. Urethane has limitations as an anaesthetic. These limitations have been investigated.

The use of ion-exchange resins for fractionating nitrogenous extractives from fresh haddock muscle has become the subject of a paper by Shewan, Fletcher, Partridge, and Brinley, J. Sci. Food Agric., 3, 394 (1952). This work has been continued with the qualitative separation and identification of the nitrogenous extractives in the flesh of over 20 species of marine and freshwater fish. Marine species appear to fall into four well-defined groups. The gadoids are characterized by the predominance of glutamic acid, glycine, and alanine with respect to the amino acids; by the predominance of creatine, creatinine, and trimethylamine oxide with respect to the other extractives; and by the presence of anserine. The flat fishes, in comparison with the gadoids,

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 ABSTRACTER: Martin Heerdt

2.1121 SWEDISH FISHERMEN USE PLASTIC TRAWL NETS

Anonymous
U. S. Department of the Interior, Fish and Wildlife Service, Seattle, Washington, Fishery Products Report No. 122 (November 12, 1953)

A newly-established net factory on the island of Donsö, Sweden, is manufacturing a plastic yarn for use in trawl nets, reports an October 20 U. S. Consular Dispatch from Göteborg. Fishermen who have tried nets made of this yarn claim that they are 5 to 7 times more durable than ordinary nets.

The plastic net is made of ordinary cotton yarn impregnated against rot and covered with plastic. Chlorinated phenols and cupric salts are used in impregnating the yarn before covering it with plastic. This yarn will not rot and has a smooth surface to which algae will not cling making for lesser resistance when the net is pulled through the water.

As the plastic yarn is new, its exact durability is not yet known but it is claimed results have been very good. It has also been found that the plastic yarn results in good catches. Bow nets made of plastic yarn have been tried and they remained clean since kelp and seaweed do not stick to the smooth surface.

The first plastic trawl nets were used in August last year and have been used again this year; and the fishermen claim this proves that the plastic yarn is rotproof. The manufacturers have received inquiries from Brazil, Palestine, and Spain, so it would seem that plastic nets may become an important Swedish export article.

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0.5 HETEROTROPHIC BACTERIA IN MARINE ENVIRONMENTS OF EASTERN AUSTRALIA

Wood, E. J. F. (Division of Fisheries, C. S. I. R. O.)
Australian Journal of Marine and Freshwater Research 4, No. 1, 160-200 (May, 1953)

Bacteria in marine environments were found to be almost entirely adsorbed on particles. Measurements were made of bacterial populations in sea water, in marine and estuarine muds, on submerged surfaces, and in fish.

Fish spoilage was shown to be largely a surface phenomenon, the great majority of bacteria occurring on the cut surfaces and the numbers decreasing rapidly with depth. With shark taken from a fish market in good condition, plate counts from the scraped surface flesh were of the order of 10^8 bacteria per gram on shark agar, while at a depth of 0.5 cm. counts had fallen to 10^7 and at 2.5 cm. to 10^4 per gram. It was also found with spoilage bacteria that the rate of reproduction and of urea decomposition decreased rapidly with increased carbon dioxide tension. No ammonia was produced from Ashworth's urea agar at 50 percent O_2 tension or less in eight cultures, though all of them subsequently produced ammonia in the same tubes in air.

The morphological and physiological characteristics of the marine bacterial flora of the area are described and the isolated species are classified. The author's work reconfirmed his previous statement (Wood 1940, 1950) that there are many differences between the floras of teleost and elasmobranch fishes. For example, there is no evidence of a succession of genera in the spoilage of elasmobranchs as there is in the teleosts. There is also a marked difference in the ratio of different genera and species associated with teleosts and elasmobranchs.

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 ABSTRACTER: Roy C. Stevens

2.1121

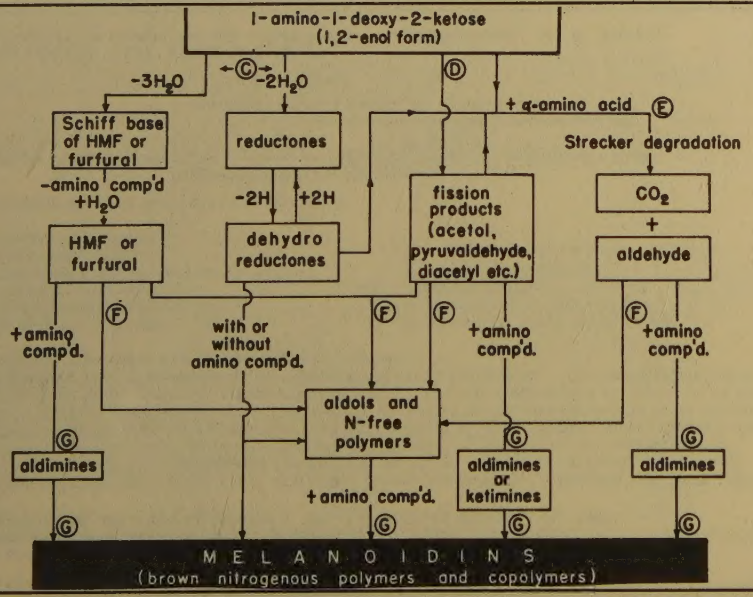
Production is growing and extensions are planned. At present work is going on in two shifts and there are orders to keep them busy until Christmas. The plastic yarn has not yet been tried for lobster and crab fishing but it is believed it will be very suitable for this purpose. The new material is about 40 percent more expensive than ordinary cotton yarn but is claimed to last at least seven times longer.

0.5 (Cross Reference: 2.01)

The author concludes that "bacteria living on the surfaces (slime, shagreen, etc.) of fish are a specialized section of the marine flora occasioned by the environment."

The article includes 54 references and 7 appendices.

0.33



0.35 (Cross References: 2.02, 7.593)

contain lesser amounts of all the nitrogenous extractives and little or no anserine or carnosine. The outstanding characteristic of the herring-mackerel group is the presence of large quantities of the basic amino acids such as histidine and lysine and the absence of anserine or carnosine. The elasmobranchs are noteworthy for the presence of sarcosine and, in some species, large amounts of betaine and trimethylamine oxide, but no histidine, carnosine, or anserine.

The characteristic features of the few fresh-water species examined are the large amounts of glycine in perch, anserine in pike, and carnosine in the eel. A more precise quantitative analysis of the nitrogenous extractives in haddock muscle has been started.

3.7 EFFECT OF INFRARED RAY ON THE QUALITY OF DRIED SKIPPER

Tsuchiya, Yasuhiko and Tomoyama, Masaaki (Tohoku University, Sendai, Japan)
Tohoku Journal of Agricultural Research III, No. 2, 331-336 (March, 1953)

The authors determined the chemical properties of oil obtained from skipper, Cololabis saira, dried in air in the normal manner, and dried with the aid of infrared light. Over 100 fresh skipper were used in the study. They were 25.3 to 29.6 cm. in length and averaged 76.1 grams in weight. The viscera and gills were removed and the fish were split along the backbone from nape to tail. They then were washed in fresh water and opened out so as to lie flat. Half of the original quantity was salted in shallow baskets using alternate layers of salt and fish in the ratio of 200 grams of salt to 1000 grams of fish. The remainder was stored without salting in a refrigerator. After the fish had been in salt or in the refrigerator for 2 days all were hung up to dry. Half of the salted fish and half of the fresh, refrigerated fish were dried for 4 days by an open window in natural air, whereas the remaining salted and fresh fish were dried in room air in front of 3 infrared lamps that were turned on for 1 1/2 hours out of a total of 6 hours of drying.

The fresh oil, the surface oil and the internal oil of the dried skipper were examined (tables 1 and 2, this card, over). About 8 percent of the total quantity of oil present appeared on the surface of the dried skipper during the drying process. The surface oil was more rancid than the internal oil. This difference in quality was more noticeable in the natural air-dried skipper oils. Both oils on being removed from the fish became more rancid after 1 month of storage at room temperature.

Infrared-dried skipper produced an oil superior to that obtained from natural air-dried skipper. The shorter drying time with its shorter exposure to air and sunlight may account for the difference in the quality of the oils. The iodine value of the external oil decreased to below 90 during drying and increased to 100 or more after 1 month of storage. The external oil of the stored fish became less soluble in ether than the internal oil.

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 ABSTRACTER: Martin Heerdt

3.231 HOW WESTERN PROCESSORS SLASH PACKAGE-FREEZING COSTS

Anonymous
Food Engineering 25, No. 9, 50-51, 180 (September, 1953)

A continuous, automatic-loading freezer recently developed by a Seattle manufacturer reportedly reduces labor costs up to 75 percent compared with manual freezer loading.

Packages of any size or thickness can be frozen simply by making minor adjustments. The unit itself requires an insulated room area of about 6 x 8 x 12 feet in height. Packages are fed into the freezer through an automatic feed mechanism located outside of this room. One single unit will freeze 1,000, 10-ounce packages per hour, and when completely charged will hold 2,160, 10 1/2-ounce packages or 1,440, 4 x 5-inch packages.

Packages are fed into the freezer 12 at a time by an operator who actuates a motor-driven ram each time a total of 12 cartons have accumulated in front of the freezer. As each lot of 12 packages is shoved between the freezer plates, 12 frozen cartons emerge on the discharge side of the unit.

The package freezer is available in three sizes. Large size units have 16 or more contact plates (cross section, this card, over). Each plate accommodates 144, 10-ounce-size packages, is 48 x 66 inches in size, and contains 70 feet of 3/4-inch square steel tubing between two sheets of galvanized steel. Each tier of 16 plates, for example, is located in a cage, which is automatically elevated or lowered by a 1-h.p. gearhead motor. At the beginning of the freezing operation the top plate is the first to be loaded. When filled, the cage is elevated and the second plate is loaded.

With packages 1 3/8-inches thick, the freezer is ready to recycle 75 minutes after loading the first plate. At this point the cage is automatically lowered and continuous feed and discharge begins. Separation of the plates for loading and compression when loaded is provided automatically.

(over)

 ABSTRACTER: Martin Heerdt

3.19 RADIATION FROM FISSION MATERIALS FOR FOOD PRESERVATION

Brownell, L. E. (Department of Chemical Engineering, University of Michigan)
Food Manufacture 28, No. 10, 383-386 (October 1, 1953)

Interest in the use of gamma radiation as a means of sterilizing food has developed recently because of the possible availability of large amounts of radioactive waste products from nuclear reactors.

X-rays have never been considered seriously as a means of sterilizing foods because of the high cost of operating these machines for this purpose. The use of electron-accelerating machines such as the Van de Graaff machine and the Capacitron have been demonstrated experimentally.

One application of ionizing radiations to the sterilization of foods might be the substitution of this process for thermal sterilization in canning. An advantage would be the elimination of the requirement for the use of elevated temperatures, while another would be the instant penetration of radiation as compared with the slow penetration of heat.

Research on this subject has been carried on by the Fission Products Laboratory of the Engineering Research Institute at the University of Michigan. The research was begun during the summer of 1951 when the laboratory received a one-kilocurie cobalt-60 gamma source. The small diameter for irradiation of samples limited the usefulness of this source. A larger source, 10 times as powerful and of different design, installed in the Fission Products Laboratory early this year, has greatly increased the range of the experiments.

(over)

 ABSTRACTER: Kathryn L. Osterhaug

3.4 ELECTROSTATICS CREATE "FLASH" SMOKING-COATING

Morse, Roy E. and Pivan, David B.
Food Engineering 25, No. 9, 70-71, 112 (September, 1953)

The electrostatic smoking method was recently employed by a West Coast fish processor who was able to convert his salmon smoking operation into a continuous process requiring only 8 minutes of actual smoking. This method offers, in addition to a saving in time, almost complete utilization of a less-than-normal volume of smoke. It is more easily controlled than kiln smoking and smoke deposition on the product is uniform. Continuous electrostatic smoking results in a large reduction in the cost of smoking operations.

The principle of electrostatic smoking is not difficult to understand. From our study of physics we know that particles of matter can become either positively or negatively electrically charged. Now suppose that we subject smoke particles to a positive charge as they come out of a smoke generator and pass fish or meats (hams) on a conveyor system at negative or ground potential through this smoke cloud. Not only the smoke particles that were traveling toward the fish or meat but all of the smoke particles in the vicinity would travel to and be deposited upon the surface of the fish or meat.

Experiments have indicated that to do an efficient job of charging or ionizing smoke particles, up to 100,000 volts direct current is required. This may be obtained by transforming normal alternating line current into current of a very high voltage and then rectifying it in a vacuum tube circuit to obtain high voltage direct current. This voltage is applied to the smoke charging grid simply by clipping the cable from the power supply to the grid. The amperage or current required can be so limited that the operation is not dangerous. A diagram of an electrostatic setup is shown.

(over)

 ABSTRACTER: Martin Heerdt

DRYING OF FISH WITH INFRARED RAYS

PRESERVATION BY IRRADIATION

AUTOMATIC FREEZING UNIT

ELECTROSTATIC SMOKING OF FISH

3.19

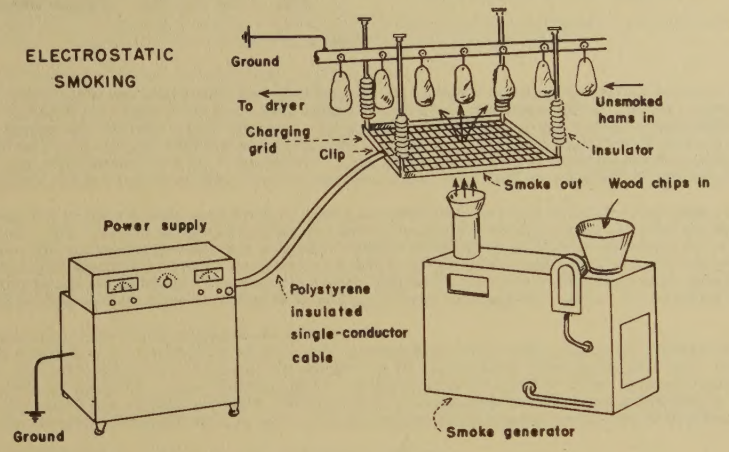
One of the first questions investigated was the dosage required to destroy various micro-organisms. A wide variety of bacteria, molds, yeasts and viruses were tested. Spore-forming bacteria were found to be the most resistant organisms tested. The spore formers B. subtilis and Cl. botulinum required an approximately six times larger dose than that required to destroy the non-spore formers, E. coli, Proteus vulgaris and L. arabinosus. Similar small doses destroyed the yeasts and molds tested.

A preliminary exploratory animal feeding study showed no difference in health, or growth between animals fed irradiated whole milk and the controls.

Future investigations will be designed to determine whether or not a diet in which the main caloric content is composed of irradiated foods is wholesome, nutritious and capable of supporting normal growth without any undesirable or toxic effects.

In the Fission Products Laboratory food has been packaged in plastic containers and in glass tubes and preserved from spoilage by microorganisms for many months. Flavor tests indicated that protein foods of animal origin are not as satisfactory as fresh vegetables when treated by irradiation. In general, these protein foods develop a strong animal-like odor and taste, and the fats become rancid. These off-odors and off-flavors are volatile and in many instances disappear upon cooking. The use of sodium nitrite in concentrations as low as 100 p. p. m. appears to be effective in preventing flavor changes from irradiation.

3.4



3.7

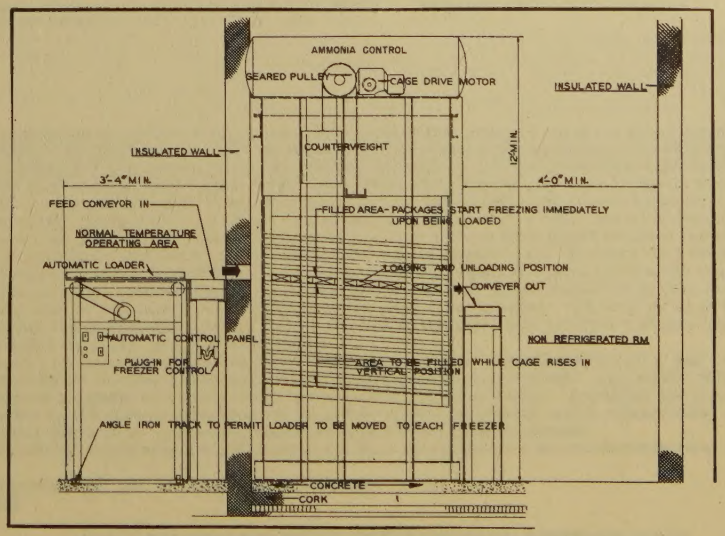
Table 1. Chemical properties of oil in dried skipper.

Kind of dried skipper		Commercial salted skipper dehydrated under natural air-drying	Salted skipper dehydrated under natural air-drying	Non-salted skipper dehydrated under natural air-drying	Salted skipper dehydrated under infrared -drying	Non-salted skipper dehydrated under infrared -drying
Moisture content of dried skipper in per cent		/	39.73	45.96	38.44	47.12
Oil content of dried skipper in per cent		/	15.62	13.20	13.06	14.49
External Oil diffused out on the body surface of dried skipper.	Per cent in dried skipper	/	0.94	1.08	0.88	1.37
	Per cent in total oil of dried skipper	2.15	5.99	8.14	6.73	9.47
	Acid value	18.01	16.11	11.34	7.88	5.95
	Peroxide value	/	0.0518	0.0495	0.0215	0.0151
	Iodine value (Wijs)	/	85.3	86.6	82.9	91.5
	Kreis test	/	+++	+++++	+++	+
Internal body oil of dried skipper	Per cent in dried skipper	/	14.68	12.12	12.18	13.12
	Per cent in total oil of dried skipper	97.85	94.01	91.86	93.27	90.53
	Acid value	14.59	9.99	10.41	4.96	4.87
	Peroxide value	0.1851	0.0214	0.0173	0.0163	0.0158
	Iodine value (Wijs)	139.2	137.8	138.1	131.6	138.5
	Kreis test	+++++ +++++	++++	+++++	++	++

Table 2. Chemical characteristics of fresh skipper oil.

Acid value	Saponification value	Iodine value (Wijs)	Peroxide value
6.40	191.3	139.4	0.0053

3.231



6.3 PROTEINS OF MARINE ALGAE

Coulson, C. B. (Institute of Seaweed Research, Inveresk, Midlothian, Scotland)
Chemistry and Industry, No. 38, 997 (September 19, 1953)

Very little has been published about the amino-acid analysis of the proteins isolated from red and brown marine algae or green marine algae other than Ulva lactuca. The authors have attempted to remedy this lack of information by isolating proteins from marine algae and examining them for their amino acids.

Proteins were obtained from dried milled Rhodymenia palmata, Pelvetia canaliculata, and Ascophyllum nodosum by extraction with 0. 2 percent sodium hydroxide solution and precipitation with glacial acetic acid at pH 4. 5 in the cold. Proteins were obtained from dried milled Laminaria cloustoni frond by shaking with carbon tetrachloride according to the method of Sevag, 1934. Proteins could not be precipitated from the alginate-containing algae (browns) without including alginate impurities.

Acid and alkaline hydrolyzates of each protein were prepared by hydrolyzing with 6N-hydrochloric acid and a saturated solution of barium hydroxide, respectively, in sealed tubes for 48 hours at 105° C. and drying in a vacuum over calcium chloride and sodium hydroxide.

Two-dimensional chromatograms of the acid hydrolyzates contained (1) a trace of histidine that was present regardless of the season or the drying temperature, (2) a spot coincident either with methionine sulfoxide or methionine sulfone or both, (3) cysteic acid, (4) on most of the chromatograms, two yellow spots that eventually became purple, and (5) the other amino acids: glutamic acid, aspartic acid, serine, glycine, threonine, alanine, tryosine, valine + methionine, phenylalanine,

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 ABSTRACTER: Martin Heerdt

6.190 JUDGING THE QUALITY OF WHOLE MEAL

Anonymous
Meldinger fra SSF, No. 4, 63-77 (June, 1953) (In Norwegian with English abstract)

The importance of riboflavin and vitamin B_{12} in the diet of chickens was confirmed by preliminary feeding experiments conducted at the Herring and Herring Meal Industry Research Institute.

Analyses of ordinary meal and whole meal made from herring were carried out to establish the value of whole meal as a source of B-vitamins. Table 1 (this card, over) shows a comparison between the riboflavin, niacin, pantothenic acid, and vitamin B_{12} content of ordinary meal and that of whole meal.

In feeding tests, the protein value of whole meal made with stickwater protein was almost as high as that of ordinary meal.

Examination of a series of commercial whole meals showed that not all of them were equivalent to the expected standard of quality. This variation in quality was believed to be due to a lack of manufacturing know-how. Therefore, if whole meals are to be sold for their superior growth-promoting qualities, their quality must be controlled by vitamin analysis.

(over)

 ABSTRACTER: Martin Heerdt

4.90 HOW MANY GOOD CHICKS FROM ONE BAG OF FEED?

Bird, H. R. (University of Wisconsin)
Feedstuffs 25, No. 35, 26, 28, 30, 32 (August 29, 1953)

In a talk given at the recent American Poultry and Hatchery Federation convention, the author explained that one way to get more eggs per bird is to improve the efficiency of the feed. As an example he cited results obtained at the Connecticut Experiment Station from feeding a high-efficiency ration.

The performance of layers receiving a typical ration containing 36 percent corn, 20 percent oats, and 25 percent middlings was compared with the performance of layers receiving a high-efficiency ration containing 61 percent corn, no oats, and 12 1/2 percent middlings. By calculation, the high-efficiency ration contained 14 percent more productive energy per unit of weight than the typical ration. In terms of production, however, the hens receiving the high-efficiency ration laid 15 percent more eggs per unit of feed consumed than the hens receiving the typical ration. These findings show that productive energy does have an effect upon the efficiency of a laying mash.

By feeding a high-energy mash the return could be increased from 192 eggs to 219 eggs per 100 pounds of feed. This would be equivalent to increasing the number of eggs per 100 hens from 48 to 57 and the hatchability from 68 to 75 percent. Fortunately, at present prices the high-efficiency feed costs not 14 % more but only 5% more than the typical mash.

The productive energy of a feed can also be increased by adding fat as well as by increasing the level of corn. Experiments at Beltsville have shown that laying hens perform quite satisfactorily on feeds containing 8 percent added animal fat. Replacing 7 percent of the middlings in the typical

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 ABSTRACTER: Martin Heerdt

6.193 IMPROVEMENT IN THE EFFICIENCY OF THE PROTEINS IN MILLED WHEAT FLOUR WITH LYSINE, VALINE, THREONINE, AND AN EXTRACT OF CONDENSED FISH SOLUBLES

Sure, Barnett
Federation Proceedings 12, No. 1 (Part 1), 431 (March, 1953)

This study was conducted on the Wistar strain albino rat and the protein efficiency ratio (PER) was calculated from gains in body weight/gram of protein intake during a 6-weeks experimental period. Milled wheat flour served as the only source of proteins in the basal ration at a 9. 70% level. Addition of 0. 4% l-lysine to the basal ration produced 190% increased growth and 201% increase in PER. Addition of 0. 4% l-lysine and 0. 2% dl-threonine was accompanied by 306 increased growth and 236% increase in PER. Addition of 0. 4% l-lysine, 0. 2% dl-threonine, and 0. 7% dl-valine resulted in 450% increased growth and 275% increase in PER. The further addition of an extract of condensed fish solubles, corresponding to 5% of the crude product in the ration, resulted in 526% increased growth and 351% increase in PER. Addition of these micro nutrients changed the PER from 0. 69 to 3. 11. The latter corresponds to the best proteins in natural foods, i. e. that of dried whole eggs. There were 12 animals, sexes equally divided, in each group. During a 6-weeks period, on the same 7 gm. daily food intake, 0. 4% l-lysine in ration produced 141. 1% increase, and 0. 5% dl-threonine produced 205. % increase in economy of food utilization than on basal ration without amino acid additions.

 Reprinted in whole

PROTEINS OF MARINE ALGAE

POULTRY FEED EFFICIENCY

WHOLE MEAL QUALITY

PROTEIN EFFICIENCY AND FISH SOLUBLES

4.90 (Cross Reference: 0.7)

ration with an equal amount of fat would raise the productive energy by 14 percent and have the same effect as substituting corn for middlings and oats. After adding animal fat at a cost of 4 cents a pound and increasing the protein level to the requirements of laying hens, the high-energy ration obtained would cost an additional 5 percent. Corn and animal fat, therefore, appear to be equally economical as a source of extra calories.

6.3 (Cross Reference: 8.51)

leucine(s), proline, arginine and lysine.

Two-dimensional chromatograms of the alkaline hydrolyzates contained (1) amino acids coincident in position with and having the same ninhydrin color as 3:5-diiodotyrosine, 3:5 diiodothyronine and thyroxine, and (2) tryptophane.

Proteins were extracted from fresh Enteromorpha intestinalis and Porphyra umbilicalis by the use of borate buffer at pH 9.2. After adjusting to pH 4.5 with glacial acetic acid and filtering through paper pulp, the extract was boiled to precipitate the proteins. The presence of histidine was confirmed by the diazotized sulfanilic acid method. Two-dimensional chromatograms of the acid hydrolyzates contained: (1) a strong spot coincident with methionine sulfoxide, and (2) a spot, possibly monoiodotyrosine, obtained only from P. umbilicalis. Two-dimensional chromatograms of the barium hydroxide hydrolyzates contained: (1) ninhydrin-reactive substances corresponding to diiodotyrosine, diiodothyronine and thyroxine, and (2) tryptophane.

Formic acid (90 percent) extraction of (1) the whole plant, (2) the thallus, and (3) the fruiting tips of Ascophyllum nodosum did not produce a sequence similar to land plants. This extract when made alkaline yielded only high-ash-containing precipitates. Precipitates were not obtainable when the extract was returned to pH 4.5 and boiled. Similar results were obtained with Laminaria digitata stipe. The addition of increasing amounts of 20 percent NaOH to an extract of L. digitata frond yielded three precipitates. The precipitate obtained at pH 5, after extraction with boiling water, yielded a low-ash-containing material with 9.29 percent nitrogen.

Table 1 gives the nitrogen and ash values for the proteins obtained.

Table I

	Ash (Dry basis)	Nitrogen (Dry basis)	State of alga	Colour
R. palmata ("Phycoerythrin")	5·09	14·56	Dry	Red
R. palmata ("Phycocyanin")	4·96	15·8	Dry	Light green
P. canaliculata ..			Dry	
1st	—	10·15		Dark brown
2nd	9·08	8·77		
L. cloustoni frond ..	14·60	5·47	Dry	Light brown
A. nodosum	10·16	6·57	Dry	Dark brown
E. intestinalis	1·93	11·76	Fresh	Green
P. umbilicalis	0·22	13·75	Fresh	Bright blue
A. nodosum	9·77	4·25	Fresh	Brown
L. digitata frond ..	7·20	9·29	Fresh	Green

6.190

Approximated Contents of Vitamins

	Ordinary meal	Whole meal
Riboflavin	5 mg/kg	8 mg/kg
Niacine	70 "	120 "
Pantothenic acid	17 "	32 "
Vitamin B_{12}	0.2-0.25 "	0.3-0.4 "

Table 1

6.2 THE TECHNOLOGY OF SHARK-LIVER OIL. I. EXTRACTION, REFINING, AND STORAGE OF THERAPEUTIC OILS

John, C. C.; Nair, P. V.; and Ramakrishnan, T. A.
Bull. Central Research Inst. Univ. Travancore, Trivandrum Ser. A, 1, 35-39 (1950)

It is suggested that livers from known species of sharks be kept in separate lots because of differences in vitamin A content. The use of metal in pilot-plant extractions is discouraged because of prooxidant action. Destearination is best accomplished by holding the oils at 10° for a few hours and then raising the temperature to 23°, at which temperature the stearins can be removed by centrifugation. Alkali washing is essential in oils derived from livers on the verge of autolysis and improves edibility and palatability of the oils. Standardization should be effected by blending oils of differing vitamin A content. Stabilization is best effected by addition of 30 p. p. m. of Antoxyl preferably with tocopherols as synergists. In storage and bottling care should be taken to assure air- and light-tight conditions.

(The above abstract appears in Chemical Abstracts 47, No. 11, 5625 (1953) and is reprinted here)

7.83 A METHOD FOR THE ESTIMATION OF HYDROGEN SULFIDE IN PROTEINACEOUS FOOD PRODUCTS

Almy, L. H.
Journal of the American Chemical Society 47, 1381-90 (1925)

An abstract of this article appeared on page 1 of the November, 1953 issue of Commercial Fisheries Abstracts. The method described was developed for determination of the freshness of fish. Through an error, the title of the abstract appeared to relate to the determination of hydrogen in fish. For complete details of the method see the November, 1953 abstract.

9.3 COMMODITY STANDARDS FOR FISHERY PRODUCTS

Hess, Ernest
FAO Fisheries Study No. 2, FAO, United Nations, Rome, Italy (April, 1953)

This 157-page publication is a digest of current laws and regulations governing the production of fishery products throughout the world. The table of contents is as follows:

Chapter I. INTRODUCTION
- A. Previous FAO Work
  1. Purpose of study -- First and Third Sessions of the FAO Conference, 1945 and 1947
  2. Questionnaire 1948 - Reports - Fourth Session of the FAO Conference, 1948
  3. Draft Report - Sixth Session of the FAO Conference, 1951
  4. Commodity Standards - General
- B. International Trade in Fisheries Products
  1. Principal Products
  2. Principal Trading Countries
- C. International Standardization Efforts
  1. International Organization for Standardization (ISO)
  2. Comite international permanent de la conserve (CIPC)
  3. Economic Commission for Europe (ECE)

Chapter II. PRESENT NATIONAL STANDARDS
- A. Standards of Containers and Packaging
  1. Barrels and Casks
  2. Wooden Boxes
  3. Metal Boxes
  4. Cartons
  5. Tins and Cans
- B. Standards of Weights
  1. Standard Weights and Size Classes of Fresh Fish

(over)

7.81 ISOLATION OF TRIMETHYLAMINE OXIDE IN SOME INDIAN MARINE FISHES

Venkataraman, R. and Chari, S. T. (Fisheries Tech. Station, Kozhikode)
Current Science 22, 86 (March, 1953)

According to the literature references cited by the authors, the quantity of trimethylamine present in marine fishes and fishery products is being widely adopted as an index of spoilage.

Trimethylamine oxide, the precursor of the amine, is known to be present in salt-water fish but its presence in fresh-water fish is a matter of divided opinion. According to this report, the authors have confirmed the presence of trimethylamine oxide in 18 salt-water fish from the west coast of Madras State.

Trimethylamine oxide was obtained from muscle juice extracted either with common salt or trichloroacetic acid and isolated in the form of a picrate derivative according to the procedure of Norris and Benoit (1945). Table I, this card, over, lists the Indian fish examined and the melting point of each picrate derivative obtained. Each derivative melted with decomposition and its melting point corresponded to the melting point (199-200° C.) of the picrate derivative obtained from chemically pure trimethylamine oxide and to the melting point (196-202° C.) shown in the literature.

(over)

 ABSTRACTER: Martin Heerdt

TECHNOLOGY OF SHARK LIVER OIL

STANDARDS FOR FISHERY PRODUCTS

ESTIMATION OF HYDROGEN SULFIDE

ISOLATION OF TRIMETHYLAMINE OXIDE

9.3

2. Standard Net Weight of Packaged Fresh, Frozen, Smoked, Salted, Dried and Marinated Fisheries Products
3. Standard Weights of Canned Fish.
4. Tolerances

C. Standards of Quality
1. Fresh Fish, (including Shellfish)
2. Frozen Fish and Shellfish
3. Salted Fish
4. Dried Salted Fish
5. Dried, Unsalted Fish
6. Smoked Fish
7. Semi-preserves
8. Canned Fish
9. By-products

D. Standards of Description
1. Type of Fish - Definitions
2. Types of Preparation and Processing
3. Marking of Containers - Minimum Requirements

Chapter III. CONTROL OF PRODUCTION AND TRADE

A. Control of Production for Export
1. Licensing and Registration of Fish Processing Plants
2. Sanitary Control of Fish Processing Establishments
3. Sanitary Shellfish Control
4. Government Supervision of Processing of Fisheries Products

B. Export Control
1. Registration of Exporting Fish Plants and Exporters
2. Export Permits
3. Export Inspection of Fisheries Products
4. Export (Quality) Certificates

C. Import Control
1. Registration of Brands or Trade-marks of Imported Products
2. Import Certificates
3. Import Inspection

Also included are 59 tables and 92 references.

7.81 (Cross Reference: 8.8)

TABLE I

Serial No.	Common name	Scientific name	Melting points of the picrate derivative °C.
1	Mackerel	*Rastrelliger kanagurta* (RUPPEL)	199-201
2	Oil Sardine	*Sardinella longiceps* (Cuv. & Val.)	196-197
3	Silver bellies	*Leiognathus bindus*	197-198
4	White Sardine	*Sardinella fimbriata*	197-199
5	"	*Clupea lile*	199-201
6	Horse mackerel	*Carax crumenoptholmus*	197-198
7	Seer fish	*Cybium guttatum*	197-198
8	Perch	*Serranus diacanthus*	196
9	Jew fish	*Sciæna coiter*	200-201
10	Soles	*Cynoglossus semifasciatus*	198-200
11	Cat fish	*Arius thalassinus*	197-199
12	Anchovy	*Engraulis mystax*	197-198
13	White Bait	*Stolephorus* sp.	200
14	Ribbon fish	*Trachurus navala*	196-197
15	Black pomfret	*Stromateus niger*	199-201
16	Shark	*Carcharius acutus*	201-202
17	Skate	*Rhinoptera* sp.	199-202
18	Prawn	*Metapenæus* sp.	196

7.51 BIOCHEMISTRY OF FISH PROTEINS

Anonymous
Report of the Food Investigation Board (Great Britain) For The Year 1952, 38 (1953)

Extracts of codling muscle at ionic strengths up to 0.2 were analyzed electrophoretically by the moving boundary method and good resolution of the components of these extracts was obtained. Codling muscle extracts of low ionic strength gave electrophoretic diagrams that appeared to differ in several important respects from those obtained with rabbit extracts. In like manner, the electrophoretic diagrams of 20 species of fish each differed sufficiently to be used to identify the species from which the extract was obtained. Variants within a species, e.g. mirror and common carp, and codling 30 cm. in length and cod 1 m. in length, showed the same diagram. Storage at -30° C. (-22° F.) for 34 weeks had no apparent effect upon the electrophoretic properties of codling extracts at low ionic strength.

Alkaline hydrolysis of purified haddock actomyosin produced ammonia in excess of what could be attributed to amide groups and arginine. This excess was correlated with the decomposition of amino acids. Analyses of free amino acids and free amino groups provided a method of calculating average peptide length and the number of peptides produced during hydrolysis. Acid hydrolysis produced more of the smaller peptides than did alkaline hydrolysis. Low temperatures and low concentrations of alkali were most favorable for the production of free amino acids and large peptides.

Hydrolysis of herring proteins by alkali reduction for the manufacture of oil and meal is similar to the process established at the Torry Station for haddock. The amount of hydrolysis that took place in a mixture consisting of equal weights of 2-3 percent NaOH and fish after two months of storage at

(over)

 ABSTRACTER: Martin Heerdt

6.133 LOW TEMPERATURE, HIGH SPEED RENDERING--THE KINGAN PROCESS

Dayen, W. R.; Christensen, K. M.; and Morse, R. E. (Kingan & Co., Indianapolis)
Food Technology 7, No. 11, 421-423 (November, 1953)

Comminution of the tissue to sub-cellular dimensions as an aid to the release of the oil makes flash rendering possible. The process is a simple continuous one-pass operation designed for rendering beef fats into oleo stock (figure 1, this card, over).

Fat-bearing tissue is reduced by grinding to a maximum particle size of 1/4 inch, then heated until fluid in a water-jacketed surge tank and pumped through a heat exchanger where the proteinaceous fraction is coagulated at about 140° F. The rendering process does not require any water. Upon leaving the heat exchanger the ground and fluid fat passes through a precision hammer mill or comminuter that completely renders it by reducing the diameter of the particles to 50-200 microns.

The rendered fluid is discharged from the comminuter and, after being brought up to the proper temperature for centrifuging, is passed into a single-stage, 3-phase centrifuge that separates it into oil, water, and solids. The solids are in the form of a dilute water slurry and probably could be recovered by passing the mixture over a shaker screen. The solids consist of high-quality edible protein and are not to be confused with "cracklings" from a conventional rendering process.

The operational sequence of a conventional rendering process for the manufacture of oleo stock is to chill the fats overnight, grind, and then cook them for 1 or 2 hours in a jacketed kettle. After cooking, the steam is turned off and the fats are allowed to settle for 1 or 2 hours. The oil is then siphoned off into a second jacketed kettle from which after 1 or 2 hours of quiescent clarification

(over)

 ABSTRACTER: Martin Heerdt

6.135 DEODORIZATION

White, F. B. (Foster Wheeler Corporation, New York City)
Journal of the American Oil Chemists' Society 30, No. 11, 515-526 (November, 1953)

Deodorization, according to the simplified modern definition, is the steam stripping of prerefined glyceride oil at elevated temperature under low absolute pressure to produce a blend or palatable edible oil.

In a discussion of theory, the author lists the following factors as being the principal ones affecting deodorization:

1. Correct preparation of oil before deodorization
2. Elimination of oxygen
3. Provision of proper conditions for distillation
   a) High temperature
   b) Low absolute pressure
   c) Adequate stripping steam
   d) Careful distribution of stripping steam
4. Materials of construction
5. Elimination of fatty acid condensation and refluxing
6. Use of metal scavengers
7. Insurance of full deodorization treatment

To clarify the theoretical considerations, he gives three graphs:

1. Theoretical stripping steam requirements at varying pressures at 445°.

 ABSTRACTER: F. Bruce Sanford

6.2332 HYDROLYTIC METHOD OF PRODUCTION OF VITAMIN-BEARING FISH FATS

Lagunov, L. L.; Bukin, V. N.; Berezin, N. T.; and Prozorovskaya, M. K.
Aka. Nauk S. S. S. R., Inst. Biokhim. im. A. N. Bahka, Vitaminnye Resursy i Ispol'zovanie, Sbornik 1, 22-70 (1951)

A detailed account with experimental details is given of the method of isolation of vitamin A concentrates in fish oils by means of alkaline hydrolysis which serves to liberate the vitamin from its complexes with proteins. The method is particularly useful for working up low grades of fish products. Essentially the final method consists of maceration of the fish liver and a 2-step hydrolysis in the 1st step of which the material is treated at pH 8.5-10.0 with an amount of NaOH equivalent to 1.5% by weight of the liver mass; material from salted fish must be treated at pH up to 13-14 with 3-4% by weight of NaOH. The process is carried out with good stirring and heating. When the saponification begins to slow down a 2nd portion of NaOH is added and the process continued to completion indicated by formation of 2 clear and distinct layers. The process can be used to supplement and improve the vitamin yields obtained by centrifugal or extraction methods.

(The above abstract appears in Chemical Abstracts 47, No. 11, 5629 (1953) and is reprinted here)

BIOCHEMISTRY OF FISH PROTEINS

DEODORIZATION OF OILS

LOW-TEMPERATURE OIL MANUFACTURE

ALKALINE HYDROLYSIS OF FISH OILS

6.135

2. Vapor pressure curves for caproic, caprylic, capric, lauric, myristic, palmitic, linoleic, oleic, and stearic acids.
3. Theoretical stripping steam requirements with the following being given as basic: deodorizing temperature -- 445° F., absolute pressure -- 6.35 mm. of mercury, and fatty acid vapor pressure -- 11 mm. of mercury.

In a discussion of the deodorizing systems in current use, the author lists the following deodorizers:

1. Standard batch
2. Modified batch
3. Semicontinuous
4. Continuous.

He illustrates each system with drawings.

In a discussion of deodorizing equipment, the author lists the following items:

1. Deodorization vessel
2. Deaerator
3. Oil heater
4. Source of heat
5. Oil cooler
6. Oil pumps
7. Vacuum equipment

He also used drawings and graphs to illustrate this part of his paper.

7.51

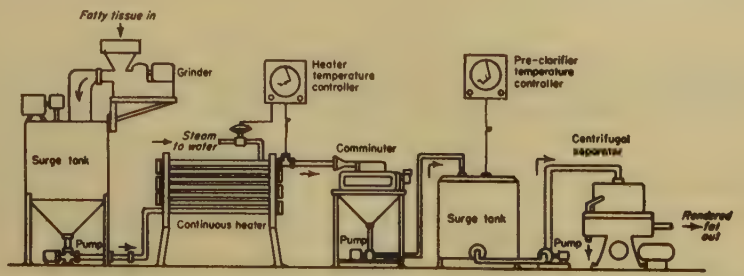
15° to 20° C. was approximately equal to that brought about by 24 hours of heating at 70° C. (158° F.). Hydrolysis was markedly increased by short periods of heating prior to storage.

6.133

the finished oleo stock may be withdrawn.

The flash process may also be used to produce lard from soft pork fats; however, fats partially covered with skin require additional equipment to achieve the initial size reduction. The capacity of the flash rendering unit may be increased by 50 percent when rendering pork fats in place of beef fats. A floor area of about 200 square feet is required to install a complete flash unit, or it may be separated into 2, 3, or 4 individual operations to utilize a number of smaller areas.

Laboratory and pilot plant studies show that flash rendering based on mechanical rupturing of the cell wall can be used to render marine and vegetable oils as well as grease, tallow, and bone. Patent applications have been filed.



4.14 THE COMPOSITION OF THE BLUBBER FAT OF CRABEATER SEAL

Winter, G. and Nunn, W. (Defense Research Laboratories, Department of Supply, Melbourne)
Journal of the Science of Food and Agriculture 4, No. 9, 439-443 (September, 1953)

A young male crabeater seal, Lobodon carcinophagus, 5 ft. 10 inches long, taken at Heard Island in the Antarctic on August 13, 1949 was the source of 5 pounds of belly blubber brought under acetone in a sealed container to Melbourne, Australia. The blubber sample, after mincing and recombining with the acetone from the original container, was subjected to evaporation for removal of the acetone. Ether was added to the sample residue and the resulting solution was dried with sodium sulfate, filtered, and evaporated for the removal of the ether. The clear yellow oil that was obtained had an iodine value (Wijs I h.) of 165.3; a saponification value, mg. KOH/g., of 190.4; an acid value, mg. KOH/g., of 1.7; and an unsaponifiable matter content, percent, of 0.4.

Methyl esters obtained by methanolysis of the yellow oil were separated by low temperature crystallization from acetone solution into concentrates of highly unsaturated, medium unsaturated, and saturated esters according to the method developed by Winter and Nunn, J. Sci. Fd. Agric. (1950). The iodine values of the fractions obtained appear in table 1, this card, over.

Each of the four fractions obtained by low-temperature crystallization was fractionally distilled at 1 mm. pressure in an unpacked column containing a 3-foot length of a sliding-fit, stainless-steel gauze strip rotated at about 2,000 r.p.m. by a motor sealed to the top of the column. The rotating gauze strip column permits fractionation of even the most highly unsaturated esters without causing changes in them and leaves residues having saponification equivalents either equal to or slightly higher than those of the previously distilled fractions. Table II (this card, over) shows the type of fractionation data obtained.

The composition of the blubber fat as calculated from the saponification values and iodine values of the various fractions according to the method of Hilditch are shown in table III (this card, over).

(over)

 ABSTRACTER: Martin Heerdt

4.64 NON-TOXIC STABILIZERS FOR ANIMAL FATS

Hartman, L. (Fats Research Laboratory, Department of Scientific and Industrial Research, Wellington, New Zealand)
Journal of the Science of Food and Agriculture 4, No. 9, 430-433 (September, 1953)

Chemical stabilizers for edible fats usually consist of (1) phenolic compounds such as gallates or substituted hydroxyanisoles, which are true antioxidants; and (2) polybasic organic and inorganic acids such as citric, tartaric, and phosphoric, which act as metal deactivators and as synergists in conjunction with natural and artificial true antioxidants. Group 1 is most effective in animal fats, which usually lack natural antioxidants; whereas group 2 is most effective in vegetable fats. Since phenolic antioxidants are forbidden throughout most of Great Britain and Western Europe, the only usable artifical stabilizers appear to be citric, tartaric, and phosphoric acids. These are found in many natural foods; however, citric acid, in particular, has wide application as a stabilizer in refined vegetable oils, particularly soybean oil.

Adding citric acid in aqueous solution to vegetable fats followed by dehydration under vacuum is easily accomplished in a vegetable oil refinery, whereas in a tallow-or-lard-rendering plant this method is often impractical. Furthermore, in the presence of an aqueous phase, citric acid might act as a pro-oxidant with animal fats if its concentration in that phase exceeds 2 percent.

Phosphoric acid was eliminated from the experimental studies because of its possible corrosive action on iron storage tanks. The stabilizing effect of citric and tartaric acids and their sodium salts was tested by adding them in the form of an aqueous solution (0.01 percent of the fat) to samples of edible beef and mutton tallow and lard. The induction periods of these fats were determined by aeration at 100° C. (active oxygen method). Some of the peroxide values determined by Lea's "cold" method are reported in table 1, omitted. These values encouraged the authors to seek a method of increasing the solubility of citric acid in fats.

(over)

 ABSTRACTER: Martin Heerdt

3.234 FREEZING FISH AT SEA

Puncochar, J. F and Pottinger, S. R. (Fish and Wildlife Service, Boston)
Food Technology 7, No. 10, 408-411 (October, 1953)

This review of progress of investigations on freezing fish immediately after being caught, for later defrosting, filleting, and refreezing of the fillets, deals primarily with work carried out at the laboratories of the U. S. Fish and Wildlife Service. There is brief mention of the work performed along similar lines in other countries.

Among the advantages of freezing fish at sea listed by Puncochar in an earlier paper are: (a) frozen fish production of uniform high quality; (b) larger pay loads; (c) utilization of prime quality of byproducts; (d) less work at sea for the fishermen, since the fish are not gutted and iced; and (e) increased efficiency of shore processing plants through holding of the frozen fish in cold storage ashore for use as needed.

Stansby and Dassow, working with fillets from flathead "sole" (Hippoglossoides elassodon) and from yellowfin "sole" (Limanda aspera), and Pottinger, et al, from work carried out with fillets from sea trout (Cynoscion regalis) concluded that immediate freezing of the fish with subsequent thawing, filleting, and refreezing of the fillets causes no marked adverse effect on quality. From data secured on percent drip, salt content, trimethylamine content, and keeping quality, Hartshorne and Puncochar found fillets from fish frozen in-the-round at sea to be as good as, or better than, fillets prepared from corresponding lots of iced fish.

Butler, Puncochar and Knake described the experimental trawler Delaware and shore facilities for the Service's freezing-fish-at-sea program. Butler and Magnusson observed, when round frozen fish were processed in a typical filleting plant, that: (a) thawed round brine-frozen scrod haddock

(over)

 ABSTRACTER: S. R. Pottinger

4.62 ANTI-OXIDANTS FOR PURE FISH LIVER OIL

Aure, L.
Fiskeridir. Skr., Ser. tek. Undersok. 1, No. 10 (1951), 15 pp.

Of the anti-oxidants tested (ascorbic acid, nordihydroguaiaretic acid, Antiranzidin, Tenox HQ (Eastman hydroquinone, food inhibitor grade), ascorbic acid and ethyl, octyl, and dodecyl gallates), only ascorbic acid and the gallates could afford satisfactory protection from rancidity without adding foreign flavour or odour in pure fish liver oils. Peroxide determinations were carried out by Lea's method (1931), and the peroxide numbers were calculated. The Kreis number was determined by a modified method. Equimolecular quantities of the various gallates had the same anti-oxidant effect in the destearinated liver oils. The amount of ethyl gallate required for effective protection, when added as a 45% solution in ethyl alcohol, was 0.03 g. per 100 g. of oil. Incorporation of 0.04 g. of ascorbic acid per 100 g. of oil, added as an ethanol solution, gave about the same protection as 0.03 g. of ethyl gallate per 100 g. of oil. Incorporation of undissolved ascorbic acid gave poor protection. The aeration method as a stability test for oils gave misleading results with ascorbic acid, added in aqueous or alcoholic solution. Storage tests showed that the ascorbic acid was more effective than the aeration test had indicated.

(The above abstract appears in Food Science Abstracts 25, No. 5, 551, September, 1953 and is reprinted here)

COMPOSITION OF SEAL BLUBBER FAT

FREEZING FISH AT SEA

NON-TOXIC ANTIOXIDANTS

ANTIOXIDANTS FOR FISH LIVER OILS

3. 234

offered no unusual complications in scaling and filleting; (b) the yield of fillets from round frozen fish was at least as high as that from iced, dressed fish; (c) the appearance of the fillets from brine-frozen haddock was comparable with that of good quality fillets from iced fish; (d) filleting, packaging and freezing of fillets from whole brine-frozen, water-thawed fish posed no new problems; and (e) the appearance, flavor, odor and texture of the fillets from round brine-frozen fish, thawed in fresh water, are quite acceptable.

Magnusson and Hartshorne determined freezing rates in an experimental freezing unit in which the fish were placed in a rotating screen drum. It was found that the effect of the bouyancy of the brine on the fish made it difficult to secure adequate agitation of the fish by simply circulating the brine. A simple water circulating system provided adequate agitation for thawing the fish. Freezing and thawing rates for whole round cod and haddock of various sizes are given.

Pottinger, Holston and McCormack found, as a result of palatability tests, that there was no definite preference for fillets prepared from unfrozen fish as compared to fillets from brine-frozen and thawed fish. Percentages of drip have shown some variation between once-frozen and twice-frozen fish, but in general these differences have been insignificant. Under optimum conditions of brine-freezing, salt penetration into the flesh of the fish has been no problem. Water-thawing reduces the salt content to approximately that of the flesh prior to freezing.

Banks states that larger quantities of fish can be brought back to Britain in satisfactory condition only by freezing the fish at sea. Reay found in trial runs with cod frozen in brine and then stored for some weeks at -10° F. without washing off the salt, that such fish could be thawed, filleted, refrozen, stored, and yield better fillets on final thawing than those obtained from 8- to 9-day-old unfrozen market cod.

Lantz, conducting experiments with flatfishes in British Columbia, found that samples frozen at sea were preferred over those prepared from fish iced at sea and frozen ashore. Harrison and Roach are investigating the application of brine freezing at sea as a means of improving quality of fish.

References to other work done on freezing fish at sea are also given.

4. 14 (Cross Reference: 8. 53)

Table I

Iodine values of fractions obtained by ice-temperature crystallization

Fraction		Iodine val.	Wt., %	Iodine val.
Soluble	80°	248·7	45·3	2·4
Soluble	45°	129·3	38·3	8·4
Soluble	20°	24·6	8·4	8·2
Insoluble	20°	2·4	8·2	

Table II

Fractionation data of portion soluble at − 45°

Fraction No.	Wt., g.	Saponification val.	Iodine val.
491	2·12	246·4	59·8
492	3·06	256·6	69·3
493	2·94	268·1	83·6
494	4·72	278·5	93·9
495	4·22	281·9	94·9
496	3·44	282·7	96·3
497	4·64	289·5	97·1
498	7·81	295·0	105·8
499	8·12	295·8	107·7
500	8·18	296·0	113·7
501	5·31	299·8	114·3
502	4·28	304·0	155·3
503	3·57	316·8	237·2
504	3·13	332·5	308·0
Residue	3·51	336·5	301·3

Table III

Composition of crabeater-blubber fat (percentage by weight)

	IS–20	S–20	S–45	S–80	Total (esters)	Fatty acids % (wt.)	Fatty acids % (mol.)
Myristic	1·0	2·8	0·6	0·3	4·7	4·7	5·7
Palmitic	6·0	3·2	0·9	—	10·1	10·1	10·9
Stearic	1·0	0·4	0·7	—	2·1	2·1	2·0
Unsaturated*							
C_{14}	—	0·1 (−2·0 H)	1·0 (−2·0 H)	2·1 (−2·0 H)	3·2 (−2·0 H)	3·2	3·9
C_{16}	0·1 (−2·0 H)	0·5 (−2·0 H)	6·3 (−2·0 H)	12·9 (−2·4 H)	19·8 (−2·3 H)	19·8	21·5
C_{18}	0·1 (−2·0 H)	0·7 (−2·0 H)	22·0 (−2·6 H)	7·8 (−4·4 H)	30·6 (−3·0 H)	30·3	29·7
C_{20}	—	0·7 (−6·1 H)	4·4 (−6·3 H)	13·9 (−8·6 H)	19·0 (−7·9 H)	19·2	17·4
C_{22}	—	—	2·2 (−10·0 H)	8·3 (−11·0 H)	10·5 (−10·8 H)	10·6	8·9

* Mean unsaturation shown in parentheses

4. 64

Citric acid was successfully introduced into fat molecules by treating the former with technical monoglycerides of various animal and vegetable fats. These reacted with up to 20 percent of citric acid and formed products that were soluble to the extent of 1-2 percent in the original fat. A fraction of this amount was usually sufficient for stabilizing purposes (table 2, below).

The stabilizing effect of these mixed glycerides of citric and fatty acids in the presence of an aqueous phase was also determined. For this test, samples of beef and mutton tallow were emulsified with 0. 2-2. 0 percent of the mixed glycerides of citric and fatty acids and 20 percent water, spread on glass in a 1-mm. layer, and held at 30°. In each instance the peroxide values, a few of which are shown in table 3, below, indicated a stabilizing action attributable to the added mixed glycerides.

Tartaric acid was difficult to react with monoglycerides and the quantity that would form mixed esters never exceeded 5 percent.

Table II

Stabilizing effect of mixed glyceryl esters of citric acid and fatty acids on various fats (acid value of esters, approximately 90)

Fat	Induction period at 100° (hours) Control	0·1% of stabilizer	1% of stabilizer
Beef I	3	11	12
,, IV	10	14	19
Mutton I	2	7	8
,, IV	10	14	15
Lard I	4	10	10

Table III

Stabilizing effect of mixed glyceryl esters of citric acid and fatty acids on fats emulsified with 20% of water

Fat	Peroxide values (millimoles of peroxide per 1000 g. of fat) 0 days Control	7 days Control	7 days 0·2% of stabilizer	7 days 2% of stabilizer	14 days Control	14 days 0·2% of stabilizer	14 days 2% of stabilizer
Beef I	0·2	8·0	2·1	1·8	25·5	10·3	9·8
,, IV	0·3	4·2	0·5	0·5	11·9	4·5	3·0
Mutton I	0·8	12·6	3·0	3·3	31·2	13·0	11·6
,, IV	0·0	5·7	1·1	0·9	15·4	6·2	4·6

9.16 WEIGHT LOSS ON DRESSING AND METHODS OF PROCESSING GAME FISH

Ford, John R. and Ball, Robert C. (Department of Zoology, Michigan State College, East Lansing)
Quarterly Bulletin of the Michigan Agricultural Experiment Station 34, No. 1, 65-74 (August, 1951)

Privately owned ponds and small lakes whose primary purpose may be to provide water for stock, irrigation, to control erosion, or to provide recreational facilities offer the possibility of producing crops of fish for sport and food with only a small outlay of capital and labor.

The problem of how best to harvest, process and utilize these fish crops was investigated in cooperation with the Michigan Department of Conservation. Species of fish used in the investigations included largemouth black bass (Micropterus salmoides) and bluegills (Lepomis m. macrochirus), which are the two most commonly raised in farm ponds throughout the country. Other species were brown trout, which shows promise for this type of production, and bullheads.

Immediately following the removal of the fish from the ponds they were sharp frozen at -20° F. and held at 0° F. until processed.

Before processing, each fish was weighed in grams and measured to the nearest tenth of an inch. The bluegills were pan-dressed by removing the scales, heads, entrails and fins. All bullheads and some bass were pan-dressed in the same manner except that they were skinned instead of scaled. The remaining bass were filleted.

The average yield of usable-size fish from four ponds in the experiment was 195 pounds per surface acre. To help determine the amount of edible food produced in these ponds, weight loss in processing was checked. The data is summarized in table 1. The reciprocal of the dressed weight percentages is the weight loss in processing.

(over)

 ABSTRACTER: Kathryn L. Osterhaug

8.59 CHROMAFFIN BODIES OF VARIOUS SPECIES OF DOGFISH

Shepherd, D. M.; West, G. B.; and Erspamer, V.
Nature 172, No. 4376, 509 (September 12, 1953)

In lower vertebrates, structures homologous to the adrenal gland of higher vertebrates remain separated throughout life. In the dogfish, for example, an unpaired inter-renal body representing the adrenal cortex is quite separate from the chromaffin bodies or rudimentary adrenal medulla. Extracts of each component can therefore be made without contamination by the other part.

Since workers in both our departments are interested in the biosynthesis of adrenaline, we have investigated by chromatographic and biological methods the amines present in the chromaffin bodies of Scylliorhinus canicula and stellaris (in Bari), Squalus acanthias and Mustelis canis (in Dundee) and Torpedo marmorata (in both Bari and Dundee). Our pooled results are shown in the accompanying table. Large quantities of adrenaline and noradrenaline are contained in these extracts; but hydroxytyramine, dihydroxyphenylalanine, dihydroxyphenylserine, tyramine and octopamine (p-norsynephrine) are not present in detectable amounts. Concentrated extracts of the livers, kidneys, intestinal tract, and inter-renal bodies of these dogfish species do not contain significant amounts of any of the seven substances mentioned.

These results do not assist in advancing the method by which adrenaline and noradrenaline are formed in the body. However, it is evident that even the pathways through dihydroxyphenylalanine and hydroxytyramine, or through tyramine and p-norsynephrine, must be considered doubtful.

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 Reprinted in whole

9.3 BRITAIN ISSUES FISH FREEZING CODE

Anonymous
Quick Frozen Foods 16, No. 3, 64 (October, 1953)

Britain's White Fish Authority has established rules governing the industry's processing and handling methods in the production of frozen fish. Experience gained from the working of this code will serve as the basis of statutory regulations to be introduced later.

To qualify as "quick frozen", fish must be frozen by a process that reduces the temperature of the whole fish from 32 degress F. to or lower than 23 degrees F. in not more than two hours and must be kept in the freezer until the temperature has been reduced to minus 5 degrees F. or below.

Fish for freezing should be of good initial quality and should be thoroughly iced while awaiting processing.

All fish intended for quick freezing should be made available at any point in the handling or processing chain for inspection by an officer duly authorized by the Authority who should be given facilities for the examination.

Where quick frozen fish is packed for sale in a wrapper or container, a slip of paper carrying a code mark should be enclosed or the package itself should bear a code mark. When fish is frozen without a wrapper, a slip of paper carrying the code mark should accompany the fish. The code mark should make it possible to identify the processor who, in turn, should be able, from the code, to provide details of purchase, freezing and storage.

(over)

 ABSTRACTER: Roy C. Stevens

9.16 INDUCING OYSTERS TO SPAWN

Anonymous
Atlantic Fisherman 34, No. 9, 8 (October, 1953)

A West Coast oyster firm has recently carried out commercial-scale experiments in the artificial inducement of oyster spawning. Over 1,000 bushels of oysters were ground up and the pulverized material was spread over the oyster beds. A few days later additional quantities of 2,000 bushels each were handled in the same way.

A biologist of the Washington State Department of Fisheries reported that the material sluiced away from the grinding machinery on the scow contained great numbers of eggs that had been fertilized in passing through the machinery. When the ground material reached the oyster beds, these oysters were also induced to release their spawn until the bulk of the mature oysters in the vicinity were spawned out.

The company obtained a commercial set from the experiment, with counts in some areas of over 250 spat per shell face. While this method of inducing spawning of oysters has been demonstrated on a laboratory scale, this is the first known commercial attempt. The success of this experiment, it is thought, may well modify the techniques of oyster growers on the West Coast and even in the East, where spawning is prolonged and setting sporadic.

 ABSTRACTER: Roy C. Stevens

FARM POND PRODUCTION OF GAME FISH

BRITISH FISH FREEZING CODE

AMINES OF DOGFISH CHROMAFFIN BODIES

ARTIFICIAL SPAWNING OF OYSTERS

9.3 (Cross Reference: 3.230)

The weights of consumer packages are covered by appropriate legislation. In all other packages the net weight at the time of packing before freezing should not be less than the weight at which the package is sold.

All quick frozen fish should be stored at a temperature not higher than 0° F. and lower where possible. The fish should be placed in cold storage immediately after freezing. Constant storage temperatures should be maintained to prevent drying.

All fish should be wrapped tightly in a moisture-vapor-proof material or should be glazed. The temperature of glazing water should not exceed 40° F.

Fish that have not been wrapped in a moisture-vapor-proof material and that are held in cold storage longer than six months should be reglazed at intervals of not more than six months.

Consumer packages and any type of frozen fish intended for subsequent storage should be shipped in insulated containers, preferably precooled.

9.16 (Cross Reference: 1.81)

9.16 (Cross Reference: 2.3)

In comparing the weight of fish harvested per acre of pond to the number of pounds of beef or poultry that an acre can support, one should remember that these fish were not fed, while most cattle and poultry are given a considerable amount of feed over and above that supplied by the range.

Table 1 -- Summary data on fish processing

Species of fish	Number processed	Size range (inches)	Average size (inches)	Weight range (grams)	Average weight (grams)	Dressed weight* (percent)
Bluegills	1,019	5.0 - 8.7	5.8	30 - 315	64.4	49.9
Bass	276	5.6 - 13.7	10.5	33 - 631	312.7	51.8
Bass (fillets)	145	5.6 - 13.8	12.3	39 - 649	454.0	30.4
Bullheads	349	5.5 - 10.5	8.4	38 - 290	155.3	40.7
Trout (rough dressed)	1,032	6.1 - 14.7	9.8	37 - 513	162.9	68.3

* Dressed weights are given as percentages of the total weights of the fish.

8.59 (Cross Reference: 1.71)

Amines (μgm./gm.) Present in the Chromaffin Bodies of Dogfish Species

Species	Adrenaline	Noradrenaline	Noradrenaline (% in total)
Squalus acanthias	900	2,400	73
Mustelis canis	1,000	2,200	69
Scylliorhinus canicula	1,150	2,200	66
Scylliorhinus stellaris	850	1,900	67
Torpedo marmorata	150	600	80

3.19 RAY-STERILIZING FOOD WRAPPERS

Kempe, L. L.; Graikoski, J. T., and Brownell, L. E. (Department of Bacteriology and Fission Products Laboratory, University of Michigan)
Food Engineering 25, No. 11, 55-56, 174 (November, 1953)

Food packages are usually contaminated with microorganisms when ready for filling. Unlabeled tin and glass containers can be sterilized with steam or hot air, but such treatment would cause irreparable damage to paper, cardboard, plastics or printed cloth.

The possibility of large-scale use of gamma radiation from fission byproducts may provide an alternative sterilizing technique. Gamma radiation will instantaneously penetrate considerable depths of material and kill microorganisms throughout the mass. This radiation is reported to be essentially harmless to common organic packaging materials at the levels required for sterilization.

Two bacteria, E. coli and B. stearothermophilus NCA 1518 were used to test the feasibility of using gamma radiation for sterilizing food packaging materials. These organisms were selected because they represent approximate minimum and maximum degrees of radio-sensitivity. Since it has been shown that yeast and mold spores are killed by radiation doses of approximately the same intensity that are effective against E. coli, they were not included in the work reported.

Specimens for irradiation experiments were inoculated by placing 0.2 ml. of an E. coli broth solution or a B. stearothermophilus spore suspension on a 1-square-inch section of the test material. The impregnated specimens were dried at 37° C. for 24 to 48 hours and placed inside individual sterile envelopes made from filter paper.

(over)

 ABSTRACTER: Kathryn L. Osterhaug

2.1127 TRAP LIFT NET FOR CATCHING TUNA BAIT FISHES

Siebenaler, J. B. (U. S. Fish and Wildlife Service, Pascagoula, Mississippi)
Commercial Fisheries Review 15, No. 8, 14-17 (August, 1953)

Lift nets used to capture bait fish under lights were found to be only moderately successful on the 1952 cruises of the Service's exploratory fishing vessel Oregon in the Gulf of Mexico. The lift nets used, however, were generally unsatisfactory in that the frames were not strong enough and the lift was either not rapid enough to catch some kinds of small fish, or the webbing split when sufficient speed was attained.

To overcome these difficulties a trap lift net was designed. The advantage of this type of net is that the sides can be lifted rapidly without having to lift the frame and the bottom of the net.

Fishing was carried out in 16 to 50 feet of water while the Oregon was at anchor, usually in the lee of an island. A 150- or 300-watt light mounted at the end of a 14-foot pole was used to attract the fish. The trap lift net with its sides down was lowered into the water from the boom over the after lee rail. The top of the frame was held from six inches below the surface to as deep as eight feet, depending on the depth at which the fish were schooling. The light was placed over the center of the net.

When a sufficient number of fish collected under the light, the sides of the net were lifted as rapidly as possible, and the frame was hoisted until the bottom was just below the surface. The catch was then scooped into the bait tanks and the net returned to fishing position.

Construction details of the trap lift net are included in the report.

(over)

 ABSTRACTER: Roy C. Stevens

2.116 NEW SONAR DEVICE SEARCHES UNDERWATER FOR SCHOOLS OF FISH

Anonymous
Maine Coast Fisherman 8, No. 4, 1, 3 (November, 1953)

A new sonar device capable of scanning the entire underwater area from the vertical to the horizontal in a 180-degree port-to-starboard arc was recently demonstrated. The new unit is a revolutionary type electronic echo-sounding instrument that operates under water like a sweeping searchlight, charting the contours of the bottom and channels, picking up stationary objects as pilings and buoys, and locating fish.

The unit operates like radar but uses bursts of high-frequency sound waves instead of radio signals. It differs from the ordinary depth sounder in that it automatically sweeps back and forth at any desired depth and gives a panoramic view of everything within its scope. Its range of "vision" is about 1,600 feet, but it also operates at 800- and 400-foot ranges. If desired, the instrument can be pinpointed to sweep a 90- or 45-degree area.

Everything the instrument "sees" is shown on a radar-type screen mounted in the pilothouse. In addition, an audio feature makes possible the identification of underwater objects by the "pings" of returning echoes.

More than simply finding fish, the device shows the distance of the school from the vessel, how deep the school is, its approximate size, which direction it is traveling and how fast. Although it is fully automatic, the unit can be operated manually to "track" schools of fish or other objects moving in the water. This is done by simply flicking a switch and then turning a control knob to direct the sound waves toward the fish.

(over)

 ABSTRACTER: Roy C. Stevens

2.01 ANTIBIOTIC INFUSIONS INTO FRESH MEAT

Anonymous
Food Manufacture 28, No. 10, 396 (October, 1953)

Beef animals were stunned, the carotid arteries exposed, the jugular vein severed and one carotid artery was cannulated, using a tube attached to a pickle pump. The animals were infused with saline containing aureomycin. In from 5 to 15 minutes of pumping, the aureomycin content of the meat was brought up to approximately 2 p. p. m.

One side of the animal was immediately chilled, the other was allowed to remain at room temperature for 48 hours prior to chilling. The sides were studied for bacterial populations, and aureomycin residues in various tissues. The meat was also tested for tenderness, moisture, and total nitrogen.

After checking with non-infused controls, it was found that not only did the antibiotic reduce bacterial population in the lymph nodes of beef rounds held at 3° C. for 48 hours, but it also kept the meat from spoiling when the rounds were held at 75° to 85° F. for 76 hours.

Most of the non-infused meat soured when held from 48 to 72 hours without refrigeration.

In all samples no flavor differences were noted that could be attributed to the infused aureomycin. The infused beef appeared to be somewhat more moist while the loin steaks from the refrigerated sides were markedly less tender than those from the sides kept at room temperature for 48 hours before chilling.

(over)

 ABSTRACTER: Kathryn L. Osterhaug

2.116

In operation, the instrument sends out high-frequency sound waves into the water from a transducer mounted on the bottom of the vessel. The secret of the instrument's scanning is the ability of this transducer to sweep back and forth automatically. When the sound waves strike objects having a density different from that of water, echoes are returned that are picked up by the transducer magnified electrically and translated into signals that show up on the radar-type viewing screen as "pips" of light or are heard as "pings".

Bearing and range are shown on the screen by the position of the "pips" in relation to a series of radial lines passing through concentric arcs. Distance is computed automatically by measuring the time interval between the sending of the sound wave and the returning echo. The distance to any object can be measured accurately since it is known that sound travels through water at a constant speed of 4,800 feet per second.

2.01

The eating quality of the infused meat was satisfactory and indistinguishable from that of untreated meat.

The experiments were carried out in the hope that such treatment might control deep spoilage when immediate chilling was not possible. Aureomycin was selected for use in the experiments after preliminary investigations had indicated that organisms residing in the lymph nodes had a close relationship to deep spoilage.

Processing meat by infusion before dressing at slaughter presents some packing house problems as well as problems of meat inspection. Nothing encountered in the studies indicates that these are insurmountable.

3.19 (Cross Reference: 3.238)

For irradiation, the specimen-containing envelopes were placed near the center of a corrugated paper box which was tightly packed with paper to simulate a box full of packages. The box was cubical and measured 14 inches on each edge. During irradiation it rested on a stand adjacent to the cobalt-60 gamma-ray "cage" with a 1-inch air space between box face and source. The distance between the cobalt-60 rods and the paper envelope was thus established at 8 inches.

Dosage was determined by placing a "Victoreen" condenser-type r-meter in the space inside the cardboard box. The meter indicated 24,840 roentgens per hour in this position. After irradiation, the specimens were transferred aseptically to a sterile flask containing 100 ml. of sterile distilled water and the flasks vibrated at 200 r.p.m. on a New Brunswick shaker. Decimal dilutions were next made from the flasks into culture media suitable for counting the resulting colonies.

The experimental data from representative experiments demonstrate that packaging materials can be sterilized with gamma radiation from cobalt-60. The required dosages are approximately 10,000 times smaller than those reported to cause damage to plastics, cellulose and cotton fibers.

Nine references are cited.

2.1127 (Cross Reference: 1.1)

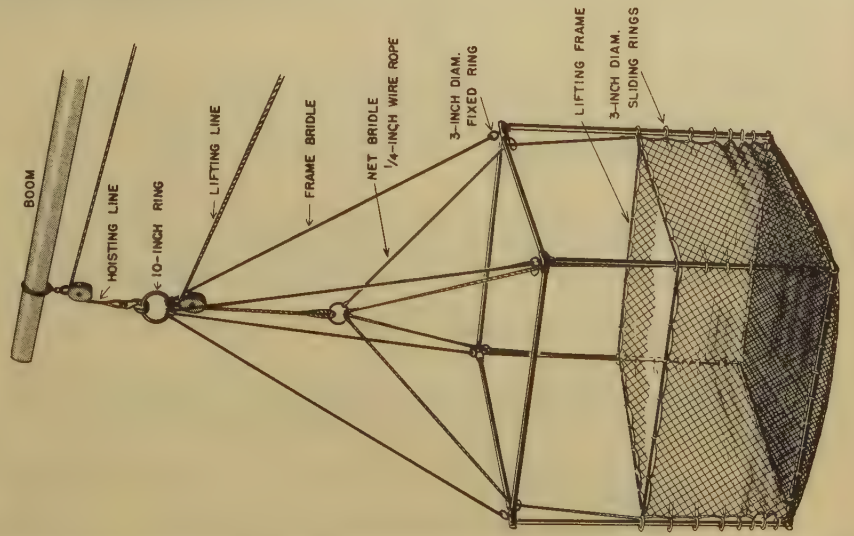

FIG. 5 - CONSTRUCTION DETAILS OF THE 8½-FOOT TRAP LIFT NET USED ON THE M/V OREGON.

0.38 THE ROLE OF SOME ENZYMES FROM FISH RAW MATERIAL IN PRODUCTION OF VITAMIN A

Dmtrovskii, A. A.
Akad. Nauk S. S. S. R., Inst. Biokhim. im. A. N. Bakha, Vitaminnye Resursy i Ispol' zovanie, Sbornik 1, 266-277 (1951)
Chemical Abstracts 47, No. 11, 5630 (1953)
Journal of the American Oil Chemists' Society 30, No. 8, 346 (August, 1953)

(Abstract of this article appears under 5.110 page 9 - December, 1953 issue)

0.38 STUDIES ON SULPHATASES

3. The Arylsulphatase and β-Glucuronidase of Marine Molluscs
Dodgson, K. S.; Lewis, J. I. M.; and Spencer, B.
4. Arylsulphatase and β-Glucuronidase Concentrates from Limpets
Dodgson, K. S. and Spencer, B.
Biochemical Journal 55, No. 2, 253, 315 (September, 1953)

0.38 ROLE OF COENZYME A IN FATTY ACID METABOLISM

Mahler, Henry R.
Federation Proceedings 12, No. 3, 694 (September, 1953)

0.6 THE TECHNOLOGY OF HERRING UTILIZATION

Jul, Mogens and Kondrup, Mog. (Editors)
Fiskeridirektoratets Skrifter, Serie Fiskeri II, No. 1, 405 pp. (1953)

(Abstract of this article appears under 9.6 page 5 - December, 1953 issue)

0.7 SOME FACTORS AFFECTING THE GROWTH AND DEVELOPMENT OF RATS FED RANCID FAT

Greenberg, Samuel M. and Frazer, A. C.
Journal of Nutrition 50, No. 4, 421 (August 10, 1953)

A diet containing 10% rancid soybean oil (peroxide no. 530-550 μ moles/g.) supported almost normal growth in rats when all known essential nutrients were supplied in large amounts and protein constituted 30% of the diet.

0.7 EFFECT OF CRYSTALLINE TRYPSIN ON THE RAW SOYBEAN GROWTH INHIBITOR

Almquist, H. J. and Merritt, J. B.
Proceedings of the Society for Experimental Biology and Medicine 83, No. 2, 269 (June, 1953)

The anti-inhibitor activity of highly purified crystalline trypsin on the growth inhibition caused by 5% raw soybean protein in chick diets was demonstrated.

0.7 TOTAL DIGESTIBLE NUTRIENTS AS A MEASURE OF FEED ENERGY

Maynard, L. (Cornell University, Ithaca)
Journal of Nutrition 51, No. 1, 15 (September 10, 1953)

0.7 HOW MANY GOOD CHICKS FROM ONE BAG OF FEED?

Bird, H. R.
Feedstuffs 25, No. 35, 26, 28, 30, 32 (August 29, 1953)

(Abstract of this article appears under 4.90 page 9)

0.7 THE EFFECT OF LEVEL OF PROTEIN FED BABY PIGS

Reber, Elwood F.; Whitehair, C. K.; and MacVicar, Robert
Journal of Nutrition 50, No. 4, 451 (August 10, 1953)

The ration containing 41% protein produced maximum weight gains and feed efficiency for the very young pigs. As the pigs approached 8 weeks of age, a level of 20% protein appeared to be used as efficiently as higher levels.

1.015 THE FISHERY FOR SARDINES IN JAPANESE WATERS

Fujinaga, Motosaku
Pan American Fisherman 8, No. 2, 10-11, 23 (September, 1953)

(Abstract of this article appears under 1.2 page 3)

1.1 GULF OF MAINE BLUEFIN TUNA EXPLORATION -- 1952

Murray, J. J.
Commercial Fisheries Review 15, No. 7, 1-17 (July, 1953)

(Abstract of this article appears under 2.12 page 3)

1.1 ON A NEW SPOROZOA, HEXACAPSULA NEOTHUNNI GEN. ET SP. NOV., FROM THE MUSCLE OF YELLOWFIN TUNA, NEOTHUNNUS MACROPTERUS

Arai, Yoro and Matsumoto, Koichi
Bulletin of the Japanese Society of Scientific Fisheries 18, No. 7, 293-298 (January, 1953)

(Abstract of this article appears under 2.01 page 13 - October, 1953 issue)

1.1 TRAP LIFT NET FOR CATCHING TUNA BAIT FISHES

Siebenaler, J. B.
Commercial Fisheries Review 15, No. 8, 14-17 (August, 1953)

(Abstract of this article appears under 2.1127 page 19)

1.1 PIONEER LONGLINING FOR TUNA ALONG THE EQUATOR

McKernan, Donald L.
Pacific Fisherman 51, No. 8, 19 (July, 1953)

1.1 TUNA ATTRACTION AND LONG-LINING--IDEAS ON HOW TO MAKE THEM WORK

Hill, James F.
Pacific Fisherman 51, No. 6, 44 (May, 1953)

1.1 "N. B. SCOFIELD" STUDIES TUNA IN EASTERN PACIFIC

Anonymous
Commercial Fisheries Review 15, No. 6, 16 (June, 1953)

1.2 HERRING BEHAVIOUR: HOW DEPTH LIMITS CHANGE THE SHOALING PATTERN (1)

"Peko"
World Fishing 2, No. 7, 276 (July, 1953)

1.2 HERRING BEHAVIOUR: HOW DEPTH LIMITS CHANGE THE SHOALING PATTERN (2)

"Peko"
World Fishing 2, No. 8, 324 (August, 1953)

1.2 THE TECHNOLOGY OF HERRING UTILIZATION

Jul, Mogens and Krondrup, Mog. (Editors)
Fiskeridirektoratets Skrifter, Serie Fiskeri II, No. 1, 405 pp. (1953)

(Abstract of this article appears under 9.6 page 5 - December, 1953 issue)

1.2 MENHADEN: KING OF THE FISH MEAL INDUSTRY

Lee, Charles F.
Southern Fisherman 13, No. 9, 133 (September, 1953)

1.2 DATA ON FISH

Behre, A.
Dtsch. Lebensmitt. Rdsch. 48, 73-80 (1952)
Food Science Abstracts 25, No. 5, 513 (September, 1953)

The author discusses the seasonal and other variations in the composition of herring.

1.2 RESEARCH AND FISHING: THE PLANKTON AND THE HERRING

"Peko"
World Fishing 2, No. 10, 404 (October, 1953)

The writer discusses the relationship between herring movement and plankton, and shows the value of the plankton indicator as an aid to fishing.

1.5 ALASKA POLLOCK: PROXIMATE COMPOSITION; AMINO ACID, THIAMINE, AND RIBOFLAVIN CONTENT, USE AS MINK FEED -- TECHNICAL NOTE NO. 27

Landgraf, R. G.
Commercial Fisheries Review 15, No. 7, 20-22 (July, 1953)

(Abstract of this article appears under 8.50 page 17 - December, 1953 issue)

1.81 INDUCING OYSTERS TO SPAWN

Anonymous
Atlantic Fisherman 34, No. 9, 8 (October, 1953)

(Abstract of this article appears under 9.16 page 17)

1.81 REPORT ON SOLIDS IN RAW OYSTERS

Price, Douglas C. and Traynor, John P.
Journal of the Association of Official Agricultural Chemists 36, No. 3, 608-617 (August, 1953)

(Abstract of this article appears under 7.43 page 1)

1.81 OYSTER GROWTH AS AFFECTED BY LATITUDINAL TEMPERATURE GRADIENTS

Butler, Philip A.
Commercial Fisheries Review 15, No. 6, 7 (June, 1953)

Oysters in the latitude of Chesapeake Bay tend to grow faster and produce more meat in unit time than oysters growing north or south of this region.

LIST OF PUBLICATIONS REGULARLY ABSTRACTED

Analyst
Analytical Chemistry
Archives of Biochemistry and Biophysics
Atlantic Fisherman
Australian Journal of Marine and Freshwater Research
Biochemical Journal
Bulletin of the Faculty of Fisheries, Hokkaido University
Bulletin of the Japanese Society of Scientific Fisheries
California Fish and Game
Canadian Fisherman
Canadian Journal of Chemistry
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Journal of Home Economics
Journal of Nutrition
Journal of the American Chemical Society
Journal of the American Dietetic Association
Journal of the American Oil Chemists' Society
Journal of the Association of Official Agricultural Chemists
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Journal of the Science of Food and Agriculture
Maine Coast Fisherman
Meldinger Fra SSF (Herring Industry, Norway)
Modern Packaging
Modern Refrigeration
National Provisioner
Nature
Nutrition Reviews
Pacific Fisherman
Pan American Fisherman
Poultry Science
Practical Home Economics
Progressive Fish-Culturist
Quick Frozen Foods
Refrigerating Engineering
Report of the Food Investigation Board (Great Britain)
Science
Southern Fisherman
Trade News (Fisheries Department, Canada)
Western Fisheries
World Fishing

Articles chosen for abstracting or inclusion as bibliographical references are those deemed of interest to the commercial fisheries and to fishery technological laboratories. Occasionally pertinent articles from sources other than the above listed publications are included. Biological papers are generally omitted.

INT.-DUP. SEC., WASH., D.C. 54781

1.71 CHROMAFFIN BODIES OF VARIOUS SPECIES OF DOGFISH

Shepherd, D. M.; West, G. B.; and Erspamer, V.
Nature 172, No. 4376, 509 (September 12, 1953)

(Abstract of this article appears under 8.59 page 17)

1.85 PRAWN FISHING IN MALAYA

Miller, D. D.
World Fishing 2, No. 9, 359 (September, 1953)

(Abstract of this article appears under 1.015 page 15 - December, 1953 issue)

1.86 BLACK DISCOLORATION ON NASS RIVER CRABS

Idler, D. R and MacLeod, R. A.
Fisheries Research Board of Canada, Progress Reports of the Pacific Coast Stations, No. 95, 56-57 (July, 1953)

(Abstract of this article appears under 2.0 page 11 - December, 1953 issue)

1.93 THE WAY WITH A TERRAPIN

Wharton, James
Gourmet 13, No. 11, 12 (November, 1953)

2.00 THE PRODUCTION AND BACTERIOLOGY OF WHALEMEAT

Anonymous
Food Manufacture 28, No. 7, 278 (July, 1953)

(Abstract of this article appears under 1.95 page 3 - December, 1953 issue)

2.01 BACTERIOLOGY

Anonymous
Report of the Food Investigation Board (Great Britain) For The Year 1952, 37-38 (1953)

(Abstract of this article appears under 0.5 page 9 - December, 1953 issue)

2.02 BIOCHEMISTRY OF FISH MUSCLE POST-MORTEM CHANGES AND EXTRACTIVES

Anonymous
Journal of Agricultural and Food Chemistry 1, No. 15, 928-943 (October 14, 1953)

(Abstract of this article appears under 0.33 page 5)

2.1123 CONSTRUCTION DETAILS OF TUNA LONG-LINE GEAR USED BY PACIFIC OCEANIC FISHERY INVESTIGATIONS

Niska, Edwin L.
Commercial Fisheries Review 15, No. 6, 1 (June, 1953)

2.1123 POWER REEL CHANGES SNAPPER FISHING

Dupre, Ernest
Southern Fisherman 13, No. 8, 57 (August, 1953)

2.1125 RUNNING UP THE SEASON'S SCORE ON DRUM SEINE OPERATIONS

Anonymous
Pacific Fisherman 51, No. 11, 31 (October, 1953)

2.1127 TRANSPLANT BAIT FISH

Anonymous
Pacific Fisherman 51, No. 12, 71 (November, 1953)

The Inter-American Tropical Tuna Commission has transplanted 4,000 scoops of anchovettas from the Gulf of Panama to the Gulf of Nicoya in an effort to re-establish a population destroyed by a "red tide" some years ago.

2.14 HAND-LINE FISHING WITH LIGHT DEVELOPED IN NORWAY

Anonymous
U. S. Department of the Interior, Fish and Wildlife Service, Fishery Products Report No. 194, Seattle, Washington (October 2, 1953)

A "lightbeam sinker" has been invented in Norway for the use of commercial and sport hand-line fishermen. The sinker is in the shape of a tube, containing a small battery and bulb with two small windows allowing two rays of light to escape. The light attracts the fish. Used with either ordinary baited or unbaited hooks, this sinker has produced some rather astounding results reports the August 22 Fish Trades Gazette, a British trade magazine.

The sinker is made of polished brass and guaranteed waterproof under pressures up to 15 atmospheres (220 pounds per square inch). Patents have been applied for in many countries and a considerable number have been exported to various countries, including the U. S. and Canada.

The "lightbeam sinker" is being produced at the rate of about 10,000 a week.

2.14 DANISH SEINING

Glanville, Alan
FAO Fisheries Bulletin 6, No. 3, 63-87 (May/June, 1953)

(Abstract of this article appears under 2.1121 page 17 - December, 1953 issue)

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